Abt Associates Inc.

Mali Agricultural Sector Assessment

Volume # 1 Summary of Findings and Recommendations

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Prepared by
Wallace Tyner
Abdoul Barry
Donald Brown
Sarah Gavian
Don Humpal
Valerie Kelly
John Mellor
Sara Piccicuto
John Staatz
Jim Tefft

Cambridge, MA
Lexington, MA
Hadley, MA
Bethesda, MD
Washington, DC
Chicago, IL
Cairo, Egypt
Johannesburg, South Africa

Abt Associates Inc.
Suite 600
4800 Montgomery Lane
Bethesda, MD 20814-5341

Contents

List of Figures

List of Tables

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Executive Summary

The purpose of this report is to assess the key opportunities and constraints for increasing the agricultural sector contribution to economic growth in Mali. USAID/Mali is in the process of finalizing its Country Strategic Plan (CSP) for the period 2003-2012. This report provides the analytical basis and recommendations for developing and implementing the new CSP.

The Setting

Malian per capita income in 1999 was about the same as it was 20 years ago. However, over these two decades, GDP per person has fluctuated considerably. During the second half of the 1980s, it fell, then moved up and down in the first half of the 1990s, and began to grow steadily in the second half of the 1990s following devaluation in 1994.

Agriculture makes up about 45 percent of Malian GDP, but its influence goes far beyond that level. In fact, most of the variability of total GDP can be explained by the fluctuations in agricultural income.

Poverty in Mali is quite high, with 64 percent of the population considered poor or very poor as measured in the Poverty Reduction Strategy Paper. Seventy three percent of the population live on less than $1/day, and 91 percent on less than $2/day. Income distribution in Mali is similar to Niger and Burkina Faso, but is less equal than Senegal, Ghana, or Guinea.

Increasing Agricultural Productivity and Risk Reduction

Increasing economic growth and reducing poverty are central objectives for USAID and for the Government of Mali. To achieve these objectives, increased agricultural productivity and risk reduction are essential, and these themes carry throughout this report. Both acute and chronic food insecurity have plagued Mali over the years. Climatic risk is a major source of food insecurity and vulnerability for the Malian population. Risk reduction and productivity improvement will be key to helping Mali become more food secure.

The economics literature provides an abundance of studies and empirical evidence that agricultural growth is essential to achieve poverty reduction and overall economic growth. In Mali, achieving a higher growth in agriculture will be absolutely essential to increasing incomes and employment and reducing poverty.

Key Assumptions

One of the important underlying assumptions in our analysis is that USAID and Mali will have to accept world market conditions as they are. Commodity prices are low in part because the U.S. and E. U. provide large subsidies for their farmers, which lead to increased production and lower world prices. There is little evidence this situation is likely to change in the near term.

Another assumption that underlies many of our recommendations is that USAID is not interested in or able to make major infrastructure investments such as building roads or electricity generation and distribution. These are very expensive activities, but very necessary in the long-run if Mali is to achieve sustained economic growth. Some other donors are working in these areas. We have focused our recommendations on the activities we believe will have the highest payoff given that roads and electricity are not expected to be an important component of near-term plans for USAID.

Summary of Major Proposed Interventions

1. **Investment in irrigation** – The potential for productivity enhancement and risk reduction through irrigation investments is enormous. Risk is reduced for the family participants because they are no longer dependent on rainfall, but it is reduced for the economy as a whole as well, because the overall market basket becomes somewhat less vulnerable to rainfall variability. The productivity enhancement is obvious - crop yields will be multiplied many fold in the impacted zones. One important crop that will be produced is rice.[1] Much of the increase in rice production will be exported to neighboring countries. The potential for increasing rice exports has been clearly demonstrated in other studies. In addition to rice, there will be an increase in horticultural crop production, which is done mainly by women. These crops are produced both for domestic and export markets. Some of them also offer potential for value-added processing. We recommend that USAID make direct investments in irrigation in collaboration with other donors. Before making the investments, a more comprehensive analysis of the benefits and costs of alternative irrigation investments should be undertaken. Possibilities include canal irrigation in the ON, *bas fond* irrigation, and small and medium scale irrigation. The objectives are to expand irrigated area to reduce risk, enhance productivity, and capture regional markets.

   Analysis needed - In collaboration with other donors, an analysis of potential irrigation investments will need to be undertaken prior to undertaking an irrigation project. The analysis should include projections for finance of the private sector components of the investment package, evaluation of the economics of the irrigation alternatives (ON, *bas-fonds*, small and medium scale, and perhaps others), and evaluation of alternative incentive mechanisms.

2. **Investment in improved variety seed multiplication, dissemination, and demonstration** – Yield increases for sorghum and millet of 20-30 percent are possible if improved seed varieties were more widely available and used in combination with fertilizer and water retention technologies. The GOM is getting out of the seed business in 2002. Analysis indicates that under current conditions, multiplication of sorghum, millet, and maize seeds is not profitable on a pure private sector basis. This is understandable under Malian conditions. Non-hybrid seed multiplication has received public support in most countries that have successfully developed their agriculture. Germplasm maintenance and foundation seed availability are keys to success in this area. USAID should work with IER and other donors to support rationalization of these basic functions. Moreover, we are proposing that USAID provide assistance to NGOs and/or producer associations who would do the seed multiplication and dissemination. A system of incentives to accomplish this objective would need to

[1] We think it is very important that no compulsory cropping scheme be imposed on farmers. That is, farmers should be free to grow rice or any other commodity they choose.

be designed. The system also should include demonstration plots on farmer fields widely spread around the country to demonstrate the benefits of improved seed, fertilizer use, and water management. Even yield increases of 10-15 percent would have major impacts on poverty and vulnerability reduction in Mali. The program should be designed so that over time some of the associations could move towards becoming full-fledged seed companies. Creating an appropriate incentive system to accomplish the multiplication and dissemination and to help the more successful operations evolve towards private seed companies is very important.

Analysis needed - An analysis of mechanisms to encourage seed multiplication by producer associations and/or NGOs is needed. This study should also estimate the potential gains from widespread adoption of improved varieties, and thereby serve as a check on the benefits of undertaking this activity. The system must include extension of production packages of appropriate seed, fertilizer, credit, and water retention technologies. The design also should include mechanisms that could lead to the development of a private seed industry in Mali.

3. **Investment in cost sharing and/or equity funds** – Investment does not occur in the food and agricultural sectors in Mali at the desired rate because the investments are too risky compared to other investment options. Thus, some means of reducing the risk is required to obtain increased investment. Cost sharing and equity funds are means of reducing the risk born by Malian or external investors. In essence, cost or equity sharing would be buying down the risk and making Malian investments competitive with other alternatives. From USAID's perspective, this approach also would leverage USAID funds probably by a factor ranging from 5 to 10. These funds could go into activities like production of day-old chicks in Mali to expand poultry production or value-added processing of agricultural commodities.

   Analysis needed - **Study of the financing system.** The fundamental problem in lending in the agricultural sector is the risk of such investments. It is recommended that USAID have a study done by a banking and financial expert with knowledge and experience in this area on risk reduction activities and strategies to support agricultural lending. There are a number of possible options including establishment of leasing companies to reduce the capital cost of investment, training programs and portfolio management, better business and financial plans to account for risk and risk analysis, changing usury laws, and the three options discussed in chapter 5: loan guarantees, cost sharing, and venture capital funds. Following this study (assuming no major impediments are identified), analysis should be undertaken to design appropriate cost sharing/equity fund mechanisms for implementation in Mali.

4. **Technical assistance in animal feeding** – Animal feed quality is a major constraint in expansion of livestock, dairy, and poultry production. Quality of feed ingredients is poor; there are no standards for blended feeds or concentrates; and there is little producer understanding of animal nutrition and its importance in production efficiency. There is potential for significant productivity gains in livestock, poultry, and perhaps dairy with successful technical assistance in this area. Greater feeding efficiency means that less feed is required per kilogram of meat, eggs, or milk produced, and ultimately means that consumers would pay less for these products than would be the case without the productivity gains. It also means that more of the products could be exported or substituted for imports. The livestock recommendation is highly complementary with the cereals recommendation.

Analysis needed - A consultation is needed to determine how best to go about animal feed quality improvements including possible implementation of grading and standards, technical assistance, etc. This activity should encompass poultry and ruminants, thereby including forages.

5. Potential interventions in other sectors:

    1. **Cotton** is the most important export commodity for Mali and represents about 8 percent of GDP. It is very important that this sector continue to grow and show increased productivity. However, it is our judgement that other donors, particularly the World Bank and France, are better positioned to work in this sector. We recommend that USAID become a member of the donor coordinating committee for the cotton sector. In the future, as Mali proceeds with restructuring of the sector, there may be opportunities for USAID to play a role in policy analysis and privatization, which will be important given cotton's weight in the economy.

    2. Mali produces a wide variety of **horticultural crops**, and there is potential to expand some of them both for domestic and export markets, particularly in the West Africa Region. Much of the horticultural crop production is done by women, so there is considerable potential for expanding this source of women's income. Expanding water availability will be needed to achieve significant productivity gains in this area.

    3. There is potential to expand **oilseed** production if certain problems can be solved. Peanuts have potential but only if aflatoxin problems can be solved. Shea production could be expanded both for domestic and regional markets. Assistance will be needed in adapting improved varieties and improving processing technology. Both peanuts and shea offer significant income potential for women.

6. **Policy analysis to achieve Malian and USAID objectives** – Success in the above activities and in many of the other areas mentioned in this report requires a policy environment conducive to achieving economic growth. We recommend that USAID support targeted policy studies designed to support and assist Malian and regional policy makers in their move towards greater market orientation. Policy studies should be undertaken as part of each of the investment activities recommended in points 1-4 above. In addition, policy analysis should be an ongoing part of each of these activities to help ensure their success. USAID should consider a policy project to group the various analyses needed and to be able to respond to future policy issues as they emerge.

    Additional related Analysis needed –

    1)Study the structure of linkages from agricultural growth in Mali to other sectors of the economy (backward, forward, consumption, fiscal, employment). Understanding the nature of these linkages is critical to know how growth in the agricultural sector (e.g., through export promotion) affects employment and income in other sectors—particularly the generation of jobs for the poor. The analysis in Chapter 3 and in Annex 2 is based on many assumptions that need empirical validation. While we believe the general conclusions are correct, it will be very important to have a much better comprehension of the nature and size of these linkages.

    2)Analysis of public finance issues at the commune and cercle level—How to effectively tap resources from increased agricultural productivity for investment in health and education

infrastructure? If increased agricultural productivity is to lead to better health, nutrition, education, and the like at the local level, some of that growth must be tapped and reinvested in programs aimed at promoting those goals. In the context of decentralization, there is a great need to examine ways that local governments can develop sustainable financing mechanisms for these programs, fueled by the increased local incomes coming from higher agricultural productivity.

7. **Long-term training** - Many of the leaders in Mali today benefited from long-term training in the U.S. We recommend that USAID bring long-term training back into its portfolio to help produce the next generation of Malian leaders.

8. The incidence of **HIV/AIDS** is probably around 2 percent at present. However, it is very important to act now to contain the spread. We recommend that all programs in agriculture be reviewed to assess the feasibility of including an HIV/AIDS information gathering and dissemination component and that the natural links between HIV/AIDS mitigation and food security interventions be exploited.

9. **Donor coordination** needs to be improved. Mali receives aid from many sources with the main players being France, Germany, Japan, the Netherlands, Canada, European Union, and the World Bank. Better coordination of activities could increase the overall efficiency of the aid delivered to Mali.

Current Activities to Continued

- The technical assistance program currently packaged in CAE should be continued. It is providing valuable technical assistance in both the agricultural commodity and value-added areas.

- Micro-finance activities should be continued, and a greater effort should be undertaken to coordinate with other donors in this area. Micro-finance program modifications may be needed based on the overall finance study recommended above. Micro-finance is critical to achieving the needed levels of agricultural growth.

- Support for the market information system (OMA) should be continued and expanded to cover other commodities and regions. Market information is vital to the efficient functioning of markets, and this project is the only currently available information in many cases. Efficient markets will be absolutely necessary for success in the other interventions proposed in this assessment.

- The OHVN system for extension and improved environmental management should be applied in the ON and other areas where USAID chooses to make investments.

Activities of Lower Priority

The major area in which the team is not as optimistic as others is in value-added processing. Our assessment is that Mali is unlikely to become competitive in many of these activities due to high transport cost, high energy cost, low economies of scale, lack of managerial talent, and a workforce of relatively low productivity. That is not to say that niche market products are impossible. Indeed, some will develop and may become profitable. We are just saying that the likely returns are higher in the areas we have outlined in this analysis.

Comparison of our Recommendations with the Draft Parameters Paper

While there are some important differences between our recommendations and the approach used in the parameters paper, there are also lots of similarities. The major differences may be summarized as follows:

- Risk reduction, whether it be in finance or production, is elevated in importance in our recommendations. Mali is a country with very high risk, and the problems need to be addressed to achieve sustainable growth.
- The recommendations contain a greater emphasis on growth of agricultural productivity as the major engine of economic growth in Mali.
- The parameters paper puts greater emphasis on value-added processing, whereas we believe the return for investment in other areas will be higher. However, the financial risk reduction mechanisms we recommend could, in fact, result in investment in these areas, but it would be more market driven (adjusted for the risk reduction).
- We put a bit more emphasis on the potential for increasing productivity in animal production sectors. We believe the potential exists, and the activity is highly complimentary with investments in cereal yield increases.
- We recommend that USAID/Mali again invest in long-term training.

If USAID were to undertake the investments outlined here and to continue the activities that are working well, we believe it will have made a very important contribution to economic growth and poverty reduction in Mali.

Acronyms

AAMA	Atelier d' Assemblage de Materiel Agricole
ACAM	Chambres d' Agriculture du Mali
AEG	Accelerated Economic Growth
AFD	Agence Francaise de Developpement
AIDS	Acquired Immunity Deficiency Syndrome
AMELEF	Associations of Horticultural Exporters
ANICT	Agence Nationale d'Investissements des Collectivites Territoriales
APCAM	Chambre d'Agriculture du Mali
APIM	Association Professionnelle des Institutions de Microfinance du Mali
ARPON	Dutch funded irrigation project in the Office du Niger
AV	Associations Villageoises (Village Associations)
BADEA	Banque Arabe pour le Developpement Economique Africain (Arak Bank for African Economic Development)
BCEAO	Banque Centrale des Etats de l'Afrique de l'Ouest (West African Central Bank)
BNDA	Banque Nationale de Developpement Agricole (National Agricultural Development Bank)
BSE	Bovine Spongiform Encephalopathy (Mad Cow Disease)
CAE	Centre Agricole d'Entreprises (Agricultural Enterprise Center)
CAS/SFD	Cellule d'Appui et de Suivie des Systemes Financiers Decentralises
CCC	Centres Communales de Conseil
CESA	Commissariat à la Securite Alimentaire
CGIAR	Consultative Group on International Agricultural Research
CIRAD	Centre International des Recherches Agronomiques de Developpement
CILSS	Centre International de Lutte contre la Secheresse
CIMA	Conference Inter-Africain de Marhe D'assurance
CFD	Caisse Francaise de Developpement
CFDT	(aka DAGRIS): Compagnie Francaise de Developpement des Fibres Textiles
CMDT	Compagnie Malienne de Developpement des Textiles (Malian Company for the Development of Textiles)
COCIM	Chamber of Commerce and Industry of Mali
COCSSA	Comite d'Orientation et de Coordination du Systeme de Securite Alimentaire CONOESAM: Coordination Nationale des Operateurs Economiques du Secteur Agro-alimentaire du Mali
COPACO	CMDT cotton export marketing company
CPP	Comite Paritaire Producteurs
CSCOM	Centres de Santé Communautaire (Community Health Centers)
CSP	Country Strategic Plan
DCA	Development Credit Authority
DGRC	Direction Generale de la Réglementation et du Controle
DNCT	Direction Nationale des Collectivites Territoriales
DNSI	Direction Nationale de la Statistique et de l'Informatique
DRC	Development Research Centers

DRSPR	Division de Recherche sur les Systemes de Production Rurale (IER)
ECIBEV	Etablissement de Credit et d'Investissement de Betail et Viande
ECOFIL	Economie des Filieres
ECOWAS	Economic Community Of the West African States
EDF	European Development Fund
EST	echalote sechee selon la methode amelioree
EU	European Union
FAO	Food and Agricultural Organization
FDV	Fonds de Developpement Villageois
FEWS	Famine Early Warning System
FIA	Fonds d'Intrants Agricoles
GAM	Generale Alimentation Malienne
GDP	Gross Domestic Product
GOM	Government of the Republic of Mali
GTZ	Gesellschaft für Technische Zusammenarbeit (German Technical Assistance Agency)
HIV	Human Immunodeficiency Virus
HUICOMA	Cotton oil processing subsidiary of CMDT
ICRISAT	International Crops Research Institute for Semi-Arid Tropics
IEC	Information, Education and Communication
IER	Institut d'Economie Rurale (Institute of Rural Economy)
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
IPR/IFPRA	Institut Professionnel Rural (Agricultural School at Katibougou)
INFOCOM	USAID Information and Communication Strategic Objective
INSAH	Institut du Sahel
ISBS	Integrated STI Prevalence and Behavior Surveillance
ISP	Internet Service Providers
KIT	Dutch Royal Institute for the Tropics
LAC	Latin American and Caribbean region
MEGA	Mali Equity and Growth through Agribusiness
MFI	Micro-Finance Institutions
MDR	Ministry of Rural Development- (Ministre du Developpement Rural)
MSD	Ministry of Social Development
NBF	Non-Bank Financial Institutions
NEAP	National Environmental Action Plan
NGO	Non-Governmental Organization
NRM	Natural Resource Management
NSC	National Seed Council
NSL	National Seed Laboratory
NSP	National Seed Plan
NSS	National Seed Service
NSVC	National Seed Variety Committee
OECD	Organization for Economic Cooperation and Development
ODIPAC	Office de Developpement Integre des Productions Arachidiers et Cerealieres
OHADA	Organization pour l'Harmonization en Afrique du Droit des Affaires

OHVN	Office de Developpement de la Haute Vallee du Niger
OMA	Observatoire du Marche Agricole
OMBEVI	Office Malien du Bétail et de la Viande
OPAM	Office des Produits Agricoles du Mali
ON	Office du Niger
ORIAM	Organizations Rurales des Intrants Agricoles du Mali (Associations of Malian Input Dealers)
ORSP	Office de Regulation et de Stabilzation des Prix
OYB	Off-Year Budget
PASAOP	Agricultural Services and Producer Organizations Program
PASIDMA	Projet d'Appui du Systeme d'Information du Marche Agricole
PDAM	Project for the Development of Poultry in Mali
PNIR	Programme National d'Infrastructure Rurale (National Rural Infrastructure Program)
PNLS	Programme National de Lutte contre le SIDA (National AIDS Prevention Program)
PPP	Purchasing Power Parity
PPV	Perimetres des Petits Villages (Small Village Perimeters)
PRISAS	Programme Regional de Renforcement Intitutionnel en Matiére de Recherches sur la Securite Alimentaire au Sahel
PRMC	Malian Cereal Market Restructuring Program
PRODEJ	Support of Commercial Courts
PRSP	Poverty Reduction Strategy Paper
RETAILEuropean	Union and World Bank Funded Irrigation Project in the Office du Niger
ROESAO	Reseau des Operateurs Economiques du Secteur Agro-alimentaires de l'Afrique de l'Ouest
SAM	Social Accounting Matrix
SAP	Systéme d'Alerte Precoce
SEG	Sustainable Economic Growth
SIM	Systémes d'Information du Marché (Market Information Systems)
SMIAR	Global Market Information Monitoring System
SO	Strategic Objectives
SOLAIMA	Societé Laitiére du Mali
SOMBEPEC	Societé Malienne de Bétail des Peaux et Cuirs
SONEA	Societé Nationale d'Exploitation des Abattoirs
SOTELMA	Societe de Telecommunications Malienne
STI	Sexually Transmitted Infections
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNDP	United Nations Development Program
UNICEF	United Nations Children's Fund
UNCTAD	United Nations Conference on Trade And Development
USAID	United States Agency for International Development
VAT	Value-Added Tax

WAEMU (UEMOA)	West African Economic and Monetary Union (Union Economique et Monetaire Ouest Africain)
WAEN	West African Enterprise Network
WALTPS	West African Long-Term Prospectives Study
WARP	West African Regional Program
WATRA	West African Telecommunication Regulatory Authority
WFP	World Food Programme
WTO	World Trade Organization

1. Introduction

The purpose of this report is to provide an assessment of the key opportunities and constraints for increasing the agricultural sector contribution to economic growth in Mali. USAID/Mali is in the process of finalizing its Country Strategic Plan (CSP) for the period 2003-2012. This paper is aimed at providing the analytical basis and recommendations for developing and implementing the new CSP.

This assessment is based largely on the many studies of Mali's agricultural and value-added sub-sectors. In addition, team members visited with a large number of Malian public sector officials, USAID officers, private sector companies and individuals, representatives of other donors and regional programs, and others.

In this analysis, we take as given the existing conditions in world markets. The high subsidy levels are likely to continue. At this writing, the U.S. Congress is poised to pass a new ten year farm bill that increases these subsidy levels considerably and probably violates even our current WTO commitments. While no one can predict crop prices far into the future, we think it is prudent to plan assuming prices may remain relatively low. For Mali, this means greater reliance on regional markets to take advantage of transport cost differentials.

Another assumption that underlies many of our recommendations is that USAID is not interested in or able to make major infrastructure investments such as building roads or electricity generation or distribution. These expensive activities are critical to Mali's sustained economic growth. Other donors are working in these areas, so our proposed strategy focuses on agricultural risk reduction and productivity enhancing activities. We do, however, urge USAID to be aware of, and even monitor, the ongoing development constraint posed by Mail's underdeveloped infrastructure.

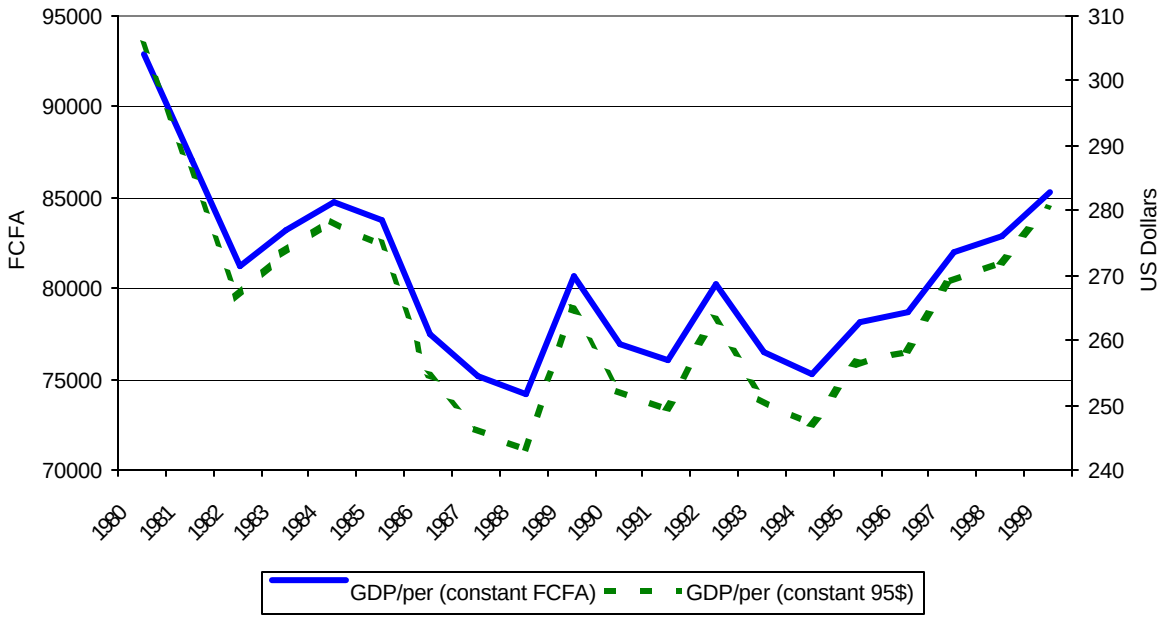
This summary (Volume I) mirrors the structure of the complete report (Volume II). It is divided into six additional chapters. Chapter 2 provides the background and current situation in Mali and a brief summary of some important lessons learned from past experience in Mali and elsewhere in the region. Chapter 3 provides an overview of the analytical framework for this analysis and develops the important linkages between growth in agricultural productivity and overall economic growth and poverty reduction. Chapter 4 contains analysis of key constraints, opportunities, and potential interventions for each agricultural subsector. Chapter 5 covers the roles and jurisdiction of different economic actors and includes a discussion of possible interventions in these areas as well. Chapter 6 provides a discussion of compliments to the productivity-led strategy including risk reduction, food security, gender, environment, and HIV/AIDS. Finally, chapter 7 contains our recommendations for USAID/Mali's programs related to rural development and economic growth.

2. Background and Current Situation

2.1. Malian Economic Performance

In real terms, per capita gross national product (GDP) in Mali is slightly lower today (1999) than it was twenty years ago. Essentially stagnant at about $275 per capita in constant 1995 US$, real GDP has increased at about the same rate as population growth. However, that overall comparison masks three distinct economic periods (Figure 1). From 1980 to 1988. the Malian economy declined markedly, in part due to the droughts of the early 1980s. From 1988 to 1994 growth was quite erratic but overall essentially stagnant. Finally, the post 1994 (devaluation) period was one of substantial economic growth.[2] Generally both the Franc CFA and US Dollar measures tell the same story with a slight deviation in the late 1980s when the US$ was falling against the French Franc, to which the FCFA is pegged.

Figure 1: Real GDP per Capita in US Dollars and FCFA

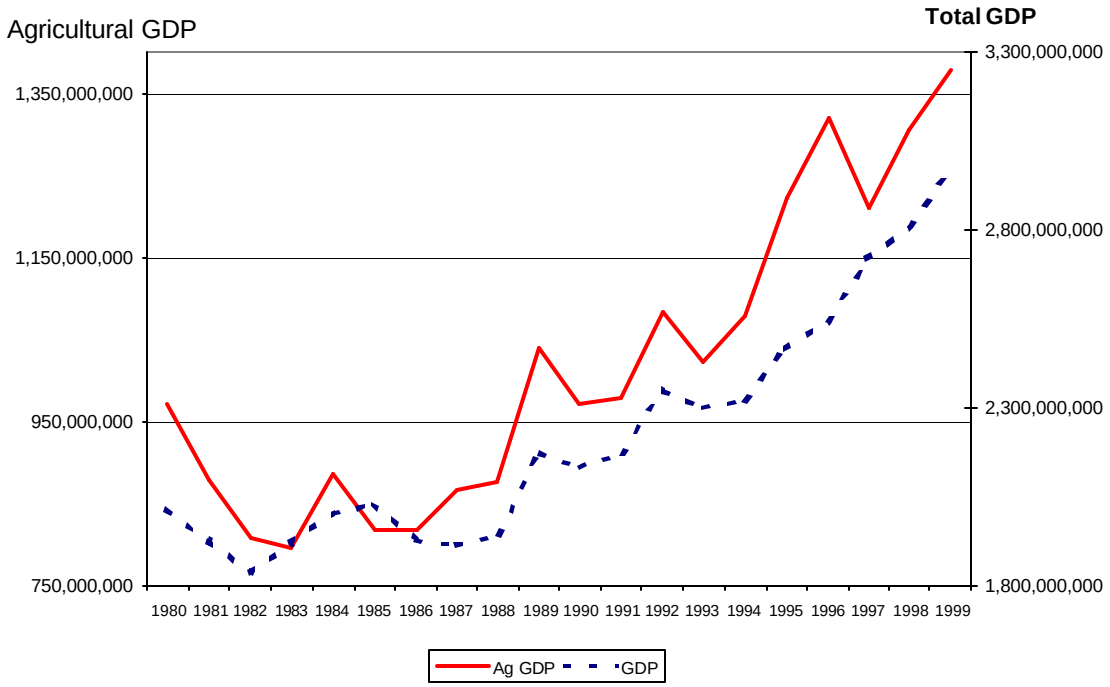


Agriculture is a main driver of Mali's economic performance.[3] Figure 2 shows the evolution of Agricultural GDP and Total GDP in Mali from 1980 to 1999 (on different axes). Agriculture generally represents about 45 percent of total GDP, but its influence through forward and backward linkages goes far beyond that level. The variability in agricultural GDP explains 92 percent of the variability in Malian GDP. Achieving higher and more consistent economic growth requires sustained, stabile agricultural growth

[2] While only preliminary data are available for 2000, it is clear that GDP dropped, due largely to the downturn in cotton prices.

[3] The importance of agriculture in stimulating economic growth and of the backward and forward linkages is covered in the section below entitled "Framework for Broad-Based Growth and Poverty Alleviation."

Figure 2: Agricultural GDP and Total GDP in Mali



The low level of economic growth is reflected in other indicators of economic and social well-being in Mali (Table 1). Illiteracy for both men and women has decreased markedly over the last two decades, but life expectancy at birth has essentially remained constant at about 42 years. While the urban population has grown quickly during this time frame, 71 percent of Mali's population lives in rural areas.

Conditions of grinding and persistent poverty are the norm for most Malians. Depending on the data, 64 to 73 percent of Malians are considered poor (Table 2). Poverty in Mali is largely, but not entirely, rural. The rural overall poverty rate (76 percent) is much higher than the urban (30 percent). Raising the poverty threshold from US$1/day to the still very low figure of US$2/day indicates that as many as nine out of 10 Malians live in dire poverty.

Income distribution also is important and is reported in Table 3. . The GINI coefficient is an overall measure of the inequality of income distribution – the higher the number, the more unequal the income distribution. For Mali it is 50.5, which is identical to that for Niger and essentially the same as Burkina Faso (48.2). Senegal (41.3), Ghana (32.7), and Guinea (40.3) all have lower GINI coefficients meaning more equal income distributions. [4] However, the Mali coefficient is lower than some Latin American countries such as Brazil (60) and Chile (56.5).

[4] GINI coefficients normally range between 0 and 1, with 0 representing perfect equality. However, the World Bank multiplies the coefficients by 100, so we report the figures as in the original World Bank data.

Table 1: Additional Economic and Social Indicators

Measure	1980	1999
Illiteracy rate, total (%)	86	60
Illiteracy rate, female (%)	92	67
Illiteracy rate, male (%)	81	53
Infant mortality rate (deaths per 1000 births)	184	120
Life expectancy, total (years)	42	43
Life expectancy, female (years)	43	44
Life expectancy, male (years)	41	41
HIV/AIDS prevalence (%15-49 year olds)		2
Percentage of population denied access to services (1998):		
Water		34
Health care		80
Sanitation		94
Rural population (%)	82	71
Urban population (%)	18	29

Table 2: Poverty Indicators in Mali

Percent			
	Very Poor	Poor	Total
PRSP/CLSP (1998 data)			
Mali	21.0	42.8	63.8
Urban	1.6	28.5	30.1
Rural	27.9	48.0	75.9
World Bank (1994 data)			
Percent below $1/day	73		
Percent below $2/day	91		

Sources: Cadre Stratégique de Lutte contre la Pauvreté (CSLP Mali), 18 October 2001, and *World Development Report 2000*, World Bank.

Notes: The PRSP data are based on living conditions relative to access to food, education, health care, employment, housing, etc. Poverty incidence is classified as either very poor or poor.

Table 3: Income Distribution in Mali

Group	Income Percentage
Lowest 10 %	1.8
Lowest 20%	4.6
Second 20%	8.0
Middle 20%	11.9
Second highest 20%	19.3
Highest 20%	56.2
Highest 10%	40.4

Source: World Development Report 2000, World Bank.

2.2. Malian Government Objectives

Ameliorating these widespread conditions of abject poverty have become the central focus of both the GOM and donor community. The Malian position for the WTO meetings in Doha (November 2001) summarizes nicely Malian government policy objectives:

> The principal objective of economic policy of the Government of Mali is to succeed in growth oriented towards the reduction of poverty. The realization of this objective, among others, is accomplished by putting into place commercial policies and investments that aim to increase the supply of goods and services destined for export or for the domestic market, by improved exploitation of comparative advantage of the country in the framework of multilateral trade liberalization.[5]

The major objectives contained in the interim PRSP related directly to economic growth and rural development are as follows:

- To reduce the incidence of poverty to 47.5 percent by 2006.
- To obtain an economic growth rate of 7.3 percent for 2002-06 with a rate of inflation of 2.5 percent.
- To increase food security by increasing and diversifying food sources and maximizing value of agricultural, pastoral, fish, and forestry production.
- To improve the productivity and protection of the environment in the framework of sustainable management of natural resources.

2.3. Donor Activities in Mali

Poverty reduction is accepted as the major objective by most of the donor community operating in Mali, and Mali receives external assistance from many external donors. The major bi-lateral donors are France, the European Union, United States. Germany, Netherlands, Japan, and Canada.[6] The major international agencies are the World Bank, UNDP, African Development Bank, UNICEF, and Arab Bank for African Economic Development. Table 4 provides a quick reference to the major activities of the larger donors in Mali. The main report describes the programs of those donors and agencies that have major programs directly relevant to economic growth and rural development.

[5] "Les propositions maliennes à Doha," in *Les Echos*, 12 November 2001, p.4.

[6] The European Union program here is treated with the bi-lateral programs, since it functions much like the other bi-lateral programs. Also, since Japan does not have an office in Bamako, we could not get information on their program but understand it is largely gifts of goods and financial resources. Japan provides support for the ON. Japan is the third largest donor in the country.

Table 4: Major Activities of Larger Donors and Lenders in Mali in Rural Development

Activity Area	France	Germany	United States	Netherlands	European Union	Canada	World Bank
Office du Niger – irrigation	■	□	□	■	□		■
Transport	■	□			■		■
Cereals market restructuring	□	□	■	□	□	□	
Decentralization	■	□	□	□	■	□	■
Other rural development	■	□	□		□		■
Micro-finance	□	□	□	□		□	
Environment	□	■	□	□	□		□
Agricultural research	□			□			□

■ = major area and large donor □ = some activity

2.4. Lessons From Past Experience

There are several important lessons learned from development experience in Mali and West Africa that need to be taken into account in creating a new strategic plan for USAID interventions over the next decade:

1. Good donor coordination is essential. Programs that have had good donor coordination such as the cereals marketing reform project generally have been more successful. In addition, the expected payoffs from improved coordination are quite large. Also, donors should do more specialization in areas for which they have a comparative advantage and leave other areas for other donors. It is neither necessary nor desirable that all donors work in all areas.

2. Proper sequencing of reforms is important. In the cereals marketing reform program, the monopoly marketing institutions had been eliminated before the 1994 devaluation. Because of that, the benefits of the devaluation were passed on through the marketing system to producers. Had the monopoly traders still existed, in all likelihood, they would have captured many of the rents from the devaluation.

3. Hard-nosed realistic assessments of investment and intervention possibilities are very important. On the surface, many value-added opportunities look promising. But the hard reality is that Mali is a very poor land-locked country with very poor infrastructure. Investments and interventions must consider that reality. Generally, investments that increase productivity in basic production, improve infrastructure, help establish the pre-conditions for success of a market economy, and target export activities will have the highest payoffs in economic growth and poverty reduction.

4. Reform is a process, not an event, and there has been a high payoff to USAID's "staying the course" on policy reform over the long-term and engaging building long-term collaborative arrangements with the Malian government and donors on these issues (e.g., through the PRMC).

5. There has been a very high payoff to building local analytic capacity in Mali to help participate in and guide policy reforms. This has helped foster greater Malian ownership of the reforms and contributed to a "learning by doing" approach to reform rather than the sterile ideological debates that have accompanied reform efforts in other countries.

6. There are strong positive interactions between cash-cropping and food-cropping activities. Cash-crops often serve as the motor to capitalize farms and finance local infrastructure, which contribute to expanded food crop production and higher farm and non-farm incomes.

7. Market reforms have been quite successful, but many problems remain in assuring consumers of reliable and affordable coarse grains in Mali. Most of the problems are due to structural problems in coarse grain production and high transportation costs in Mali.

3. Broad-based Growth and Poverty Reduction

As part of the scope of work for this assessment, the team was asked to evaluate the backwards and forwards linkages of the agricultural sub-sectors and their potential for increasing incomes, reducing poverty and generating employment. A rigorous treatment of those relationships in the Malian context would require substantial data collection and modeling and thus was not possible within the scope of the resources available for this mission. There is, nevertheless, a well developed theoretical literature on such linkages supported in by empirical studies on other developing countries. We will therefore present the major findings of this literature and interpret qualitatively in the light of the realities of the Malian economy and major recommendations of this agricultural sector assessment.

3.1. Striving to Reduce Poverty and Hunger

Research from the 1960s to the present clearly demonstrates the importance of agricultural development in stimulating economic growth and reducing poverty. Poverty, hunger and famine continue to increase in Africa (AIRD 2001). Although economic growth alone cannot solve all the problems associated with poverty and hunger, these conditions cannot be eradicated without economic growth (Timmer….). Evidence is clear that rapid economic growth causes poverty to decline more quickly than does slow growth. Evidence is mixed on the matter of relative poverty, usually measured as the income share of the poorest fifth of society. Overall growth causes incomes of the poor rise proportionately with average incomes (Dollar and Kraay 2001) but the poor's income share can actually fall under certain growth scenario (Eastwood and Lipton 2001). Pro-poor growth therefore looks for ways to improve not only the absolute incomes of the poor, but also their relative position.

Agriculture must be an essential element of any pro-poor growth strategy. Several studies suggest that growth in the agricultural sector reduces poverty more than growth in the industrial sectors (Eastwood and Lipton, 2001). Thirtle, et al. summarize the literature as follows: [7]

> The literature provides overwhelming theoretical and empirical evidence that agricultural growth is essential, especially in the poorer developing countries. It identifies the diverse roles that agriculture plays in the process of growth and development on the one hand, and the link between economy-wide growth and poverty alleviation on the other.

Hazell and Haddad characterize the linkages as follows:[8]

> In poorer countries, agriculture typically accounts for the lion's share of national income, employment and export earnings. Under these conditions, even a modest growth rate for agriculture can have significant leverage on the national economy. Rapid agricultural growth contributes to the economic transformation in a number of important ways. It supplies basic foods, raw materials for agro-industry, and exports, and frees up foreign exchange for the importation of strategic industrial and capital goods. It releases labour and capital (in the form of rural savings and taxes) to the non-farm sector. It generates purchasing power among the rural population for non-food consumer goods and services

[7] Much of this material is taken from a paper by Colin Thirtle, et al., "Relationship Between Changes in Agricultural Productivity and the Incidence of Poverty in Developing Countries," DFID Report No. 7946, 2001.

[8] P. Hazell and L. Haddad, *CGIAR Research and Poverty Reduction*, IFPRI, 2000.

and therefore supports growth in services and trade and provides a nascent market for an emerging manufacturing sector. It reduces poverty by increasing labour productivity and employment, and by lowering food prices for all.

Thirtle, et al. do a cross-section analysis of the relationship between agricultural productivity and poverty using World Development Indicators data from the World Bank (2000). They do several statistical analyses relating land and labor productivity to poverty measures, specifically the proportion of people living on less than $1 per day. Their results clearly demonstrate a strong statistical relationship between agricultural productivity and poverty. Depending on the model and data set used, a 10 percent increase in crop yields leads to a reduction in the percentage of people living on less than $1 per day of between 6 and 12 percent. For African countries, a 10 percent increase in yields leads to a 9.4 percent decrease in the percentage of those living on less than $1 per day. Research from the 1960s to the present clearly demonstrates the importance of agricultural development in stimulating economic growth and reducing poverty. It is for this reason that this analysis focuses on measures to stimulate growth in agricultural productivity.

3.2. Linking Agricultural Growth to Poverty Reduction

The development literature makes it abundantly clear that agricultural growth is inextricably linked with poverty reduction. Mellor (1999) illustrates how the process works:

- Agriculture is a large sector in most developing country economies and as such, has an important absolute and relative effect on overall economic growth and job creation. Although tempered by its tendency to grow more slowly than other sectors and to benefit from labor-saving technologies, changes in this large sector can have a big influence on employment.

- Secondly, rising incomes in agriculture are the dominant source of demand for the labor-intensive small-scale sector in rural and market towns. (Mead and Liedholm 1988, Liedholm and Mead, 1987). Farmers typically have a high marginal propensity to consume domestically produced goods. The host of rural small businesses producing rural housing, furniture, local garments, shoes, baskets, as well as a wide range of personal services has little access to urban or international markets.

- Finally, agricultural growth not only generates incomes for farmers and in turn their local goods and service providers, but it generates the additional food needed to meet consequent growing demand. Because food usually dominates the expenditure basket of the poor, poverty reduction requires that rising incomes be accompanied by a simultaneous increase in the quantity of food. Otherwise the resulting inflation would choke of non-farm growth (Mellor, 1966).

3.3. Agricultural Growth and Poverty Reduction in Mali

Poverty dominates Mali. Seventy three percent of the population falls below the World Bank's $1/day poverty line (Table 2) The bulk of poverty reduction occurs through increased income of the poor – hence the OECD/DAC primary focus is on income poverty, even while setting targets for education, health, and gender. Indeed, reducing the latter aspects of poverty is highly complementary with reducing income-related poverty. Furthermore, without sustained economic growth, countries will lack the resources needed to sustainably fund programs aimed at improving health, education, and expanded opportunities for women.

3.3.1. Stimulii To Poverty Reduction

The poor have few assets other than labor, and so it is increased employment that generates the bulk of poverty reduction. Increased employment increases incomes of the poor by increasing the amount of time bringing in income, and, as increased employment tightens the labor market, by raising real wages. Rapid poverty reduction comes when employment grows faster than labor force growth, for a long enough period of time, to bring a substantial increase in real wage rates. Thus, in relating agricultural growth to poverty reduction one must ask what the contribution of agriculture is to employment growth. The poor also benefit from lower relative food prices as agriculture grows rapidly, but that is a natural accompaniment of the employment impact. Food security is, of course, closely related to poverty.

3.3.2. Agriculture And Employment Growth, Sectoral Shares

Because agriculture is so large, even a less than proportionate increase in employment is important in aggregate. Far more important, the increased incomes of prospering farmers are largely spent in rural areas, including the small market towns. In very low-income societies such as Mali, that creates an important market for agricultural produce. But, expenditure on rural non-farm goods and services is also important. To the extent that this expenditure is on domestically produced goods rather than imports, the expenditure further stimulates economic activity and growth. Further, as farmers prosper they increasingly substitute hired laborers, who are amongst the poorest people in rural areas, for family labor. That substitution of hired for family labor is particularly important in the case of family labor from children and wives, both in farm production and in household work as maids, which is a major source of employment for the poor.

These powerful, indirect effects of rising agricultural incomes explain why recent studies of the structure of growth show that rural growth is far more powerful than urban growth in reducing poverty. The same is true for agricultural growth compared to manufacturing growth. Our findings are fully consistent with those intertemporal and international studies.

Economic data are rarely categorized in a manner to show the effect of agricultural growth on employment (and hence on poverty reduction). Table 5 presents reasonable approximations of the necessary data for Mali, constructed from national income accounts, including those in the World Banks "World Tables." In essence, this table reflects the growth rates for the various sectors that would be necessary to achieve an overall economy growth rate of 4.9 percent. (Annex 2 presents the data from which Table 5 is derived and a full set of explanatory notes on assumption and calculations.)

It is striking that in Mali 94 percent of incremental employment is generated in the rural sector. Of that, well over half is in the rural non-farm sector. The urban sector, excluding small market towns that are included as rural, accounts for only six percent of incremental employment. That portion is so small in substantial part because foreign aid, which represents 14 percent of GDP, is shown as not growing (it fell by half in the five years up to 2000). Thus, the fast growth of eight percent shown for the urban formal sector is offset by the lack of growth in foreign aid. Consequently, the multiplier to the labor-intensive urban non-formal sector is quite modest.

Table 5: Employment Growth and Related Data, by Sector, Hypothetical Projections for Mali from 1999-2000

Sector	Gross Domestic Product			Employment			
	Size of Sector (% GDP)	Growth Rate	Share of GDP Growth	Base Percent	Elasticity	Growth Rate	Share of Employment Growth
Rural Sector	70	5.6	80	90		3.7	94
Agriculture, tradable	22	6.6	30	22	0.6	4.0	22
Agriculture, non-tradable	25	3.8	19	33.5	0.6	2.3	20
Rural non-farm	23	6.6	31	34.5	0.9	5.9	52
Urban Sector	30	3.2	20	10		2.2	6
Formal (tradable)	0 9	8	15	0.9	0.4	3.2	1
Non-formal (non tradable)	0 7	3.4	5	6.3	0.9	3.1	5
Foreign aid	14	0	0	2.8	0.0	0.0	0
Grand Total	100	4.9	100	100	3.9	3.7	100

Explanatory Notes: See Annex 2.

The rural non-farm sector bulks large in employment growth for three reasons: it is large, it experiences fast growth (by assumption), and it is very employment intensive. It is difficult to establish the size of the rural non-farm sector, but placing it about half as large as agriculture in proportion of GDP seems consistent with data on sources of income on farms and labor force data The rural non-farm sector includes many people who may be nominally declared as farmers, but who in fact derive a high proportion of their income from rural non-farm activities.

Demand for the rural non-farm sector's output is determined by the growth of farm incomes. The farmer's marginal propensity to spend on the sector is high. The standard is to multiply the growth in per capita farm income by 1.5 and then add the population growth rate to obtain the growth of the sector. That is consistent with a marginal propensity to spend on the sector of 0.5 – that is, half of incremental income is spent on rural non-farm goods and services.[9]

It is further assumed that labor productivity does not increase much as the rural non-farm sector expands. While agriculture expands substantially through technological change, the rural non-farm sector is driven by rising demand from rising farm incomes. Expansion is largely through the increase in the number of enterprises, not growth of existing enterprises. That confirms the tendency for factor proportions to remain the same and hence for labor productivity not to rise significantly. Agriculture and the formal urban sector both tend to expand with rising labor productivity, thereby diminishing the effect of growth on employment.

[9] Because we do not have good estimates of these multipliers and linkages for Mali, these values should be treated as "best guesses" at this point.

The growth assumptions in Table 5 provide an overall growth rate of employment of 3.9 percent. That is 1.7 percentage points greater than the labor force growth rate of 2.2. With the increase in the growth rate from increasing weight of the faster growth sectors and the benefit of compounding, employment will increase by about 10 percentage points more than the labor force growth over a five year period. The important question is can the 5.1 percent growth rate in agriculture be achieved. It should be noted in passing that the 7 percent growth rate of aggregate GDP assumed in the PRSP is unlikely to be achieved, since it must assume an even faster growth rate in agriculture than the 5.1 percent assumed here.

3.3.3. Composition Of A High Agricultural Growth Rate

Table 6 shows the composition of the growth rate of 5.1 percent shown for agriculture. While this does not constitute a prediction for future growth, the data provide a basis for judging what has to be done to achieve a growth rate in agriculture that will make a substantial impact in reducing poverty.. To the extent that given growth rates are not achieved in some sub-sectors, others will have to grow faster, or progress in poverty reduction will be reduced. This section makes it clear how important it is to make every effort to implement the priority actions and to have them succeed in substantially raising the agricultural growth rate if poverty reduction targets are to be met.

Table 6: The Composition of a High Growth Rate for Agriculture, by Subsectors, Mali, Subsequent to 2001

Sub-Sector	Percent Agricultural GDP	Growth Rate, Percent	Proportion of Growth
Crops, Tradable	27	7.0	37
Livestock, Tradable	20	6.0	24
Livestock, Non-Tradable	6	6.0	7
Crops, Non-Tradable	33	4.0	26
Forestry, Non-Tradable	14	2.2	6
Total/Average	100	5.1	100

Explanatory Notes: See Volume 2, Annex 2.

Note that in Table 6 agriculture is divided into tradable and non-tradable subsectors. That is because at least initially major portions of agriculture have to grow faster than domestic demand. Those are the tradable components. The components are as follows:

- Tradable crops are comprised largely of exports beyond the region – principally cotton.[10] Because Mali does not export enough to influence global prices, the major constraints are technology, area planted and world price. The very rapid growth rate of seven percent would require significant improvement in technology as well as substantial expansion in area.
- Tradable livestock must grow at an optimistic six percent per year. Currently close to half of livestock production is exported. Table 6 assumes that all livestock products except milk and eggs are exportable (about three-quarters of the livestock sector). There is also some potential for import substitution for milk and eggs. The market for livestock, unlike cotton, is traditionally in neighboring countries of the region. Expanding into that market requires a combination of rapid growth in demand in the neighboring countries (spurred perhaps by their own attention to

[10] Increasingly rice is a regional export, and there is considerable potential to expand regional rice exports.

agricultural growth) and technological improvement in the Malian livestock sector to increase competitiveness and market share in the neighboring countries.

- Non-tradable agriculture (primarily coarse grains) accounts for over half of the agricultural sector (see Delgado et. al. for a full exposition of this view).[11] The bulk of demand must come from domestic sources either for food or feed. Demand for food will grow if GDP growth reaches the 4.9 percent shown in Table 6 and the high proportion of population in poverty indicates an income elasticity of demand of .67. Demand could grow faster if substantial quantities of coarse grains are pulled into a rapidly expanding livestock sector or if exports to neighboring countries grow rapidly. Malian farmers should be able to meet a four percent increase in demand under reasonable assumptions about technological progress in coarse grains production.
- Non-tradable livestock products (largely milk and eggs) must grow about six percent per year. This rate is consistent with the proposed 4.9 percent income growth and an income elasticity of demand of 1.4. That elasticity is consistent with the income elasticity of demand for those products in countries with similar income levels to Mali.
- Non-tradable forestry products is quite large at 14 percent of agricultural GDP. The sector principally produces fuel for domestic use and is expanding at the same rate as the labor force. That in turn assumes inelastic demand, with increments in fuel consumption coming from non-domestic forestry sources.

3.3.4. Implications For Poverty Reduction

Our findings have chastening news for poverty reduction. The urban sector cannot achieve growth rates sufficient to make a significant dent in present poverty levels. That is because it is so small, a position reinforced by the heavy weight of foreign aid in the urban sector. Even the urban non-formal sector cannot be expected to expand rapidly. Moving to new heights with a higher growth path is a formidable task.

Thus, the burden for employment growth and poverty reduction falls on agriculture, particularly through its multipliers to the labor-intensive rural non-farm sector. Even with an assumption of a 5.1 percent growth rate in agriculture, its multipliers are still modest and the employment impact, while accumulating to something quite substantial in five years, will be all too low if there is a significant shortfall in the agricultural growth rate.

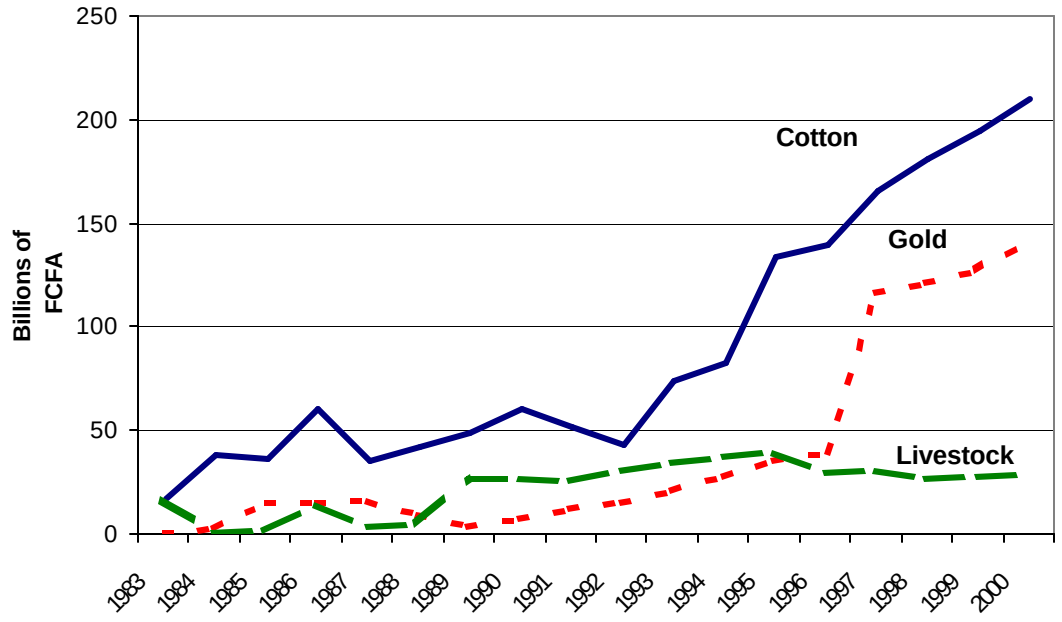
As shown in the discussion of Table 6, the 5.1 percent growth rate for agriculture presumes stellar performance in each agricultural sub-sector. That requires a substantial set of actions as delineated in this report and clear priority of those actions. Indeed, this is a formidable task, but there is no other option. This chapter demonstrates that success in increasing agricultural productivity and growth will cause a major reduction in poverty levels.

[11] In fact, there are some course grains traded regionally, and there may be increasing potential in the future.

4. Strategic Opportunities and Challenges for Key Agricultural Subsectors

This section provides a review of the key constraints, opportunities, and possible interventions for each of Mali's major agricultural subsectors. In terms of exports, three commodities (cotton, gold, and livestock) represent 90 percent of Malian exports. Cotton and gold constitute about 80 percent of all exports. Cotton exports have been growing rapidly since 1992, and gold has grown significantly since 1996 (Figure 3). Livestock exports, which increased in 1994 following the CFA devaluation, have since stagnated. Rice exports to the region are growing but the level is still small. Small quantities of sorghum and millet are also traded regionally. Likewise there is a small but growing export potential for horticultural and poultry products.

Figure 3: Major Malian Exports



4.1 Cotton

Production of seed cotton and lint for export has historically been the most intensively managed and supported commodity subsector in Mali. It is managed by the *Companie Malienne de Développement des Textiles (*CMDT), owned jointly by the GOM and the former *Compagnie Française de Développement des Fibres Textiles* (CFDT), known now as DAGRIS. The Malian government and DAGRIS hold 60 percent and 40 percent, respectively, of the subscribed capital share of CMDT. Until the late 1980s, CMDT carried out ginning and marketing of seed cotton on the behalf of the government, operating with a pre-approved annual budget under the supervision of the Ministry of Finance. All export revenues from cotton were deposited in a government account and used to finance both the CMDT's pre-approved budget and cotton taxes and related expenses.

The relative success of cotton in Mali may be due in part to the vertical integration of the sector offered by CMDT. The cotton subsector comprises a well-integrated system spanning from input distribution to the marketing of cotton fiber. The CMDT approach begins with a varietal breeding research program that integrates Mali's national agricultural research program at the *Institut d'Economie Rurale* (IER) into a network of other West and Central African breeding programs managed by the *Centre International des Recherches Agronomique de Développement (*CIRAD). Newly released seed varieties are tested and adapted to the Malian physical environment through a tight working relationship between the Institut d'Economie Rural (IER), the CMDT extension services, and farmers. Seed is provided to farmers free of charge. Meanwhile, farmers purchase other inputs (fertilizers, fungicides, and equipment) through the CMDT-managed credit system that enables the CMDT field agents to deduct the loan amount from the value of the output.

This highly integrated management and commercial system has resulted in rapid production growth over the past decade. Farm level yields grew rapidly in the late 70s and 80s, averaging 1300 kg/ha in the late 1980s. Inadequate farmer incentives, poor cropping practices (including inadequate input and manure use) and pesticide resistance have contributed to a recent drop in yields. This decline in average yields is due in part to expansion in area to less productive soils. The recent productivity trend raises the issue of cotton production sustainability in the years ahead and calls for vigorous action to maintain and raise productivity in the future.

4.1.1 Assessment Of Value Added Potential

Experience in many high-income countries has shown that textile and apparels have laid the foundation for industrialization by learning the basic skills for manufacturing. Some think that Mali could venture into textiles to add value to its locally produced cotton fiber. However, we concur with the AIRD 1999 report and do not suggest USAID investment in downstream cotton processing sectors.

4.1.2 Key Constraints

There are several important constraints to improving competitiveness and value added:

- *High transport cost* – Because of its poor transportation infrastructure, Mali has very high "natural" transport costs, pushed even higher by government taxes. The tax situation is very complicated, and there is no easy fix.
- *Inefficient transformation and marketing system* – The differential between cotton seed and cotton lint prices is very large in Mali, implying that the inefficiencies in these areas result in the farmer getting less return for the cotton produced. According to an unpublished World Bank paper, cotton seed prices for 1984-97 for Mali, Zimbabwe, and India were 42, 72, and 90 percent respectively of lint export prices. Monopsony losses to farmers in Mali were substantial (Sanders 1999).
- *High energy cost and limited supply* - The limited supply and high cost of electrical energy in Mali greatly hinders potential for value-added activities for Malian cotton. Though completion of the Manantali dam should soon expand energy supply, most of the gains will go towards meeting the rapidly swelling urban demand rather than industrial demand. Providing sufficient electricity at affordable prices will be key to expanding manufacturing potential in the coming years.
- *Low world prices* – due to a significant extent to subsidies provides to European and American farmers.

4.1.3 Opportunities and Potential Interventions

The recent cotton crisis has prompted the Malian government to seek assistance from the donor community. This government has already engaged discussions with the World Bank and the French Cooperation to bail out CMDT, which has been in financial distress. These and future discussions represent an opportunity to restructure the entire system. The opportunities in the cotton sector come from potential gains from privatizing cotton ginning and marketing and through alleviating the constraints mentioned above. Although promising, privatization must be approached cautiously, as the subsector represents half of Malian export earnings. The process needs to be tried on a pilot basis in one region, and then expanded to other areas based on lessons learned in the pilot zone.

In terms of potential interventions, USAID likely will play only a marginal role in this restructuring process. If USAID decides it wants to become involved in the cotton subsector liberalization, following are some possible intervention areas:

- Help producer associations replace the CMDT managed input and credit systems in the future with their own processes to handle these critical needs;
- Extend the market information system to provide complete coverage of market information for cotton products;
- Help Mali prepare for international fiber negotiations under the aegis of the World Trade Organization (WTO);
- Help producer associations to establish sustainable production systems with less environmental degradation;
- Contribute to building the key transportation infrastructure needed to improve cotton sales and eventually, transformation; and
- Working with producer associations and extension agents to incorporate HIV/AIDS education into other extension activities.

We recommend that USAID become a member of the donor coordinating committee for the cotton sector. As a result of deliberations in this committee, USAID may identify useful interventions.

4.2 Rice

4.2.1 Subsector Overview

Rice is grown on only three percent of sown areas of Mali. Rice production has been increasing significantly since the early 80's, from less than 110,000 tons in 1984/85 to over 427,000 tons in 1998/99. This annual increase of nearly 10 percent is due to (1) major liberalization programs launched through the *Programme de Restructuration des Marchés Céréaliers* (PRMC) and (2) development and irrigation rehabilitation projects. These projects contributed significantly to the upsurge of rice production in the *Office du Niger (*ON) area, which has a huge potential for rice cultivation with full water control. While only 50,000 hectares are currently under irrigation, the irrigable potential in this area could be as much as one million hectares. [12]

[12] Probably more realistic estimates put the economically irrigable area at less than 300,000 hectares, but that is still a very large irrigation potential.

Based on water source and the level of water flow control, the country's rice production systems can be classified into three sub-sytems: (1) the fully controlled irrigation subsystems in large (*Office du Niger*, Baguinda, Manantali, and Selingué) or small perimeters along the Niger (1,700 km) and Senegal Rivers; (2) the partially controlled irrigation subsystems which are found in smaller irrigated perimeters (*Opération Riz Ségou, Opération Riz Mopti, Opération Riz Sikasso*) and smaller rivers in the south; and (3) the largely undeveloped traditional flooded plains and *bas-fond* sub-system, which are found mostly in southern Mali. Currently, the largest share (48 percent) of the rice area (126,078 ha) is found in the flooded plains, followed by the fully irrigated subsystem (25 percent; 65,953), the traditional *bas-fond* (14 percent; 37,264 ha), and the partially irrigated (13 percent, 34,588 ha) sub-systems."[13] Rainfed rice is grown in the CMDT area where rainfall exceeds 1,000 mm/year. This type of cultivation, which accounts for nearly 10% of national production, is expanding, and yields are about 1.6 T/ha (FAO, 1994).

Recently, the government took steps to reform the old land tenure law in which land was exclusively under State ownership and as such, the ON was in charge of managing it. The right of the farmer was to use land it only for a fee depending on the quality of irrigation infrastructure. While the old tenure law granted priority to the settlers of the ON, the new one gave Malian and non-national interested parties broad access to land as long as they are in compliance with the rules set by the ON. The main objective of the new land tenure law is to provide tenure security to farm families and promote private investments in the zones that are not under production yet.

The importance of the new land tenure law cannot be overemphasized for Malian policies makers because it opens new opportunities for the private sector to undertake profitable investments. It will also stimulate additional employment in rural areas. By relieving the GON of the responsibility for managing land, the new land tenure system liberates government resources for alternative (hopefully productive) investments. However, land reform always is difficult, and measures must be taken to ensure that land is not taken away from local residents to the benefit of outside interests.

With the liberalization of the rice subsector, paddy production, milling and marketing have been completely taken over by the private sector. The introduction of small mills has enabled farmers to process their paddy into rice and sell it in the open market to wholesalers or their representatives. This process has been so widespread that the once- powerful large-scale mills have gone out of business. Rice is then shipped to the domestic consumption markets. In recent years, rice has been exported informally to the regional markets, albeit in small quantities.

4.2.2 Key Constraints

Several of the constraints faced by the cotton subsector also hamper efforts to expand rice production and trade:

- *World rice prices* – According to Barry et al. (1998), Mali's comparative advantage in rice extends beyond its borders, namely in the northern part of Cote d'Ivoire and almost as far as the center of that country. Low world prices serve to shrink the range over which Mali's rice exports can compete with foreign varieties imported to West Africa..

[13] George Dimithè, "Small-Scale Inland Valley Swamp Rice Production: a Viable Enterprise in the Grain-Cotton Farming System of Southern Mali," in *Democracy and Development in Mali*.

- *High transport and tax costs* – The high transactions cost of acquiring rice inputs and marketing output also erode the competitiveness of Malian rice exports.

- *Under-investment in irrigation* – Despite low international prices and high transactions costs, rice is still profitable on domestic markets. Meeting that demand will require bringing additional land under irrigation. At present, however, the private sector lacks the capital to make such investments.

- *Land tenure problems* - The government has rewritten the land tenure law, but it has not been applied yet because the decentralization underway has not defined clearly the responsibility of the different local, village level and regional governments.

- *Credit for irrigation investments* - Irrigated land is not likely to expand because credit will not be extended to the private sector to invest in the irrigation infrastructure. The credit constraint is closely linked to the lack of guaranty for the financial institutions and potential lenders, thereby putting them at risk in an environment where enforcement of transactions is difficult.

- *Processing issues* – To take advantage of quality premiums, Mali needs to improve the homogeneity of rice seed and the humidity content of paddy that varies widely due to poorly synchronized cultivation, harvesting and processing.

4.2.3 Opportunities And Potential Interventions

The prospects for the competitiveness of Malian rice in the nearby regional markets look good, even in the face of low world prices. The most promising consumption markets for Malian are in Cote d'Ivoire where rice is the preferred staple food for the middle class. The rising middle class in Ghana that is shifting consumption from roots and tubers to rice needs to be targeted in the years to come.

There are several ways that USAID can help the Malian rice subsector. As quality remains a constraint, courses like those offered by the Center for Agro-Enterprises (CAE) to teach improved post-harvest technologies to rice processors and traders should be vigorously extended. The bulk import of packaging material by the project is a useful activity that aims to organize traders so that they can undertake large-scale import to lower their cost.

Another possible intervention for USAID in the future would be to help expand irrigated rice production at the Office du Niger where only a small portion of the irrigable land is currently under use. Mali, being marginally self-sufficient in rice, could position itself to supply its rice to the vast regional market by expanding production. The USAID-sponsored Guaranty Fund facilitates private sector access to credit to invest in irrigation perimeters and reduce risk. As the banking sector is reluctant to offer agricultural loans, the Guaranty Fund appears a useful mechanism to alleviate the credit constraint at the Office du Niger. If successful, it could be extended gradually to a larger pool of credible investors. Increasing the loan amount for investment in secondary and tertiary canals should be explored in the medium term. Investments in the primary canals are beyond the capacity of the private sector. USAID could join forces with other donors to undertake these kind of large scale capital investment in the Office du Niger. USAID would want to examine potential from all the irrigation approaches discussed above to design a

package of interventions that will yield the greatest decrease in risk and gain in productivity per dollar invested.

4.3 Maize, Millet, and Sorghum

4.3.1 Subsector Overview

Millet and sorghum can be grown in an environment with annual rainfall ranging between 400 and 700 mm. In contrast, maize, having a higher water requirement, is concentrated in southern Mali. This region also accounts for more than half of millet/sorghum supply in Mali. Because of these differences, maize will be treated separately from millet and sorghum in this analysis.

Starting from a low base, maize is one of the fastest growing cereal crops. Production grew by over 10 percent per annum from 1984 to 1999. By comparison, millet and sorghum production increased by less than 2 percent per annum over the same period (from a larger base). The increased supply of coarse grains resulted almost entirely from area expansion, particularly for maize. Maize area increased from just over 89,000 hectares in 1984/85 to approximately 426,000 hectares in 1999/00, representing almost a five-fold hike during the period. These increases were concentrated in the southern production zones of CMDT, where maize is grown in a complementary rotation with cotton.

Contrary to cultivated area, productivity for coarse grains has stagnated at best over the 15 year period. However, yields for these commodities appear to have improved markedly following the devaluation of the CFA franc, suggesting farmers responded to higher prices by adopting higher yielding inputs (Barry, 2000). Good rainfall in recent years has also contributed to making Mali one of the main coarse grain suppliers for regional markets.

The cereal market reform program introduced in 1981 changed the complexion of grain trade in Mali. Responsibilities related to coarse grain marketing were shifted from the Office des Produits Agricoles du Mali (OPAM) to private sector producers, collectors, semi-wholesalers, wholesalers, retailers, and processors.

4.3.2 Key Constraints

Increasing coarse grain production is constrained by several factors:

- *Rainfall variability* -. Production for rainfred crops in the semi-arid Sahel is always highly variable, making investments risky.

- *Access to appropriate input packages* –Cereal yields could be increased considerably if farmers had better access to improved seeds, fertilizer, water retention technologies and the accompanying credit. Private seed multiplication is not profitable, and the government is getting out of seed multiplication in 2002. While fertilizer use may not be profitable for millet (see the fertilizer section in chapter 5), it appears profitable for maize and sorghum. Thus a package of seeds, fertilizer, and water retention technologies could bring about substantial yield improvements in a relatively short time.

- *Post harvest handling* - The high percentage of dirt and foreign elements constrains access to regional markets.

4.3.3 Opportunities and potential interventions

There exists considerable potential for absorbing a substantial increase in coarse grain production in regional food markets as well as the expanding domestic and regional animal feed industry. Nearby Mauritania and Senegal have feed shortages and expanding the market information system in these areas could prove profitable.

Potential interventions in the coarse grain subsector need to address seed supply, grain quality, and value added. The Institut d'Economie Rurale (IER) and ICRISAT have available varieties that routinely yield double the one ton per hectare average in Mali for sorghum and millet.[14] Yet this seed is not being multiplied and extended onto farmers' fields. A project providing incentives to producers' associations or NGOs to multiply this seed and demonstrate packages of seed, fertilizer, and water retention technologies could yield substantial widespread benefits in terms of higher incomes and poverty alleviation. At the very least, USAID should proceed to an analysis of the seed multiplication and dissemination constraints and how they might be alleviated.

USAID currently provides technical assistance to cereal traders to enable them to market a higher quality product. Increasing cereal quality should go hand in hand with setting norms and standards in both Mali and the regional markets. As Mali is one the leading cereal producers in West Africa, it is well positioned to take the lead on cereal norms based on objective criteria.

4.4 Livestock/Meat Subsector

4.4.1 Subsector Overview

The available statistics on livestock numbers, consumption, exports, etc. are poor and often contradictory. Livestock production is widespread throughout Mali, involving at least 30 percent of the Malian workforce, contributing 10-12 percent of value added in GDP, 25-30 percent of value added in agriculture, and more than 10 percent of export earnings (Yiriwa). In addition, linkages are important to the crops sector, through the use of animal traction, manure, use of agricultural by-products as feed, and the role of animals as "savings accounts" in rural areas. Small ruminants (sheep and goats) are widely held in rural areas; thus, increases in their productivity could lead to broad-based increases in income, especially for women. In rural areas, for example, women dominate milk marketing and are often involved in small ruminant production. In addition, nearly 40 percent of small ruminants are produced in the arid Northeast (regions of Gao, Kidal, and Tomboctou), compared to only 14 percent of cattle. Therefore, efforts to increase income from small ruminants would have important sub-regional income distribution effects.

[14] However, it is not clear how much of this yield difference is due to the seed and how much to differences in fertilizer use.

Cattle/Beef

Total cattle numbers are estimated at 6.4 million head in 1999, with an annual growth rate of 3% (after taking account of an annual offtake of roughly 10.5 percent). The growth in herd size has been much greater in the agro-pastoral areas (particularly in the CMDT region) than in the pastoral areas (Metzel et al., p. 5), owing to greater feed availability. Production in most of the country is extensive, taking advantage of the Mali's widespread availability of forage in the rainy season and dry-season grazing possibilities in the interior delta of the Niger River. There is some use of supplementary feeds (agricultural by-products—particularly cowpea hay, peanut hay, and cotton-seed meal) in the agro-pastoral and peri-urban zones, both for fattening and for maintenance of draft oxen (which after a few years are sold for beef). The herds are managed as dual purpose, providing milk for local consumption as well as meat. Intensification via smallholder-managed fattening of livestock in peri-urban areas is expanding. Attempts at larger-scale feedlots have generally proven unprofitable.

After years of concern about the "unwillingness" of Malian pastoralists to sell their animals and the consequent overgrazing of pastures, offtake rates jumped sharply in 1994 and 1995 following the CFA franc devaluation. Faced with higher prices, cattle owners sold off many older animals (Yade and Staatz, 2001). The higher offtake rates were not sustained after 1995, falling back into the 10 percent range.

Small Ruminants/meat

Sheep and goats are a particularly important form of production and savings in rural areas. There are approximately 16 million small ruminants in Mali, an average of 1.6 head per resident. Production is concentrated in the north, with over 60% found in the Gao, Timbuktu, Kidal and Mopti regions (compared with 36% of the cattle in the country). These animals are particularly adapted to the more sparse range and browse conditions of the north. Their shorter reproductive cycle than cattle means that production can be increased more quickly than cattle if there is sufficient feed. While they are an important export, between 68% and 80% of offtake in recent years has gone to domestic consumption in recent years. Sheep and goat meat is the most widely eaten meat in rural areas. In addition to the coastal markets, there is a significant (though largely unrecorded) export of small ruminants towards Algeria.

4.5 Assessment Of Value Added Potential

Mali has historically been a major exporter of cattle and small ruminants, and studies of domestic resource costs confirm Mali's comparative advantage in production of live animals for export (Metzel et al.). Cote d'Ivoire, Ghana, and to a much smaller extent, Senegal, Algeria, and Nigeria, have been the main export markets for live cattle. Emerging markets include Guinea and Benin.

Roughly half the cattle sold for slaughter each year and nearly 80% of the small ruminants are consumed domestically. The trade is in the hands of the private sector, and most evidence suggests that it is fairly competitive. Market information is collected through OMBEVI (*Office Malien du Bétail et de la Viande*) and is diffused via the Malian agricultural market information system (OMA).

The major areas historically stressed for value added have been through improving the quality of animals slaughtered via improved nutrition, and genetic improvement, lowering marketing costs, and shifting to exporting a greater proportion of meat in place of live animals. Of these, the scope for productivity gains and value added is greatest through improved nutrition and reduced marketing costs.

4.5.1 Key Constraints

The main constraints to expanded ruminant production are the following:

Inadequate feed availability and quality. There is widespread consensus and documentation indicating that feed constraints are much more important in limiting livestock production in Mali than are genetic constraints. The feed problem has two aspects:

- inadequate dry-season forage, which leads to significant weight loss during the dry season and weakens the condition of work animals; and
- costly or unavailable concentrate feeds. This problem is closely related to the failure to fully liberalize the cotton-seed market. Distortions in this market have led to feeds that use excessive amounts of cotton seed or cotton-seed meal, and to non-market allocations of it that often lead to shortages.

A potential constraint for the future is how pasture resources will be managed at the commune level under decentralization. Each rural commune will be required to establish and manage its own communal grazing area and livestock paths. How these systems are managed and what rights are granted to herders who are not permanent residents of the commune (e.g., those with transhumant herds) could have a major impact on feed availability and livestock productivity.

Non-tariff trade barriers, particularly in Côte d'Ivoire and Senegal, which act like a tax on Malian cattle exports to these countries, thus making Malian meat less competitive in the neighboring markets.

Effective demand–One of the biggest uncertainties facing the Malian livestock market is the evolution of effective demand, particularly in Côte d'Ivoire. On the negative side, disruption of this market, due to political uncertainty in that country could have major impacts on cattle prices in Mali; hence, the need to diversify export markets. On the positive side, growth of income both in domestic and export markets, and hence demand for higher quality meat, will increase the returns to seasonal fattening.

Costly transport - both for live animals and for refrigerated transport of meat, linked to the poor state of the available trucks and rough roads.

Potential export competition from Europe and the U.S.- In the late 1980s, Mali's share of coastal export markets for beef was seriously eroded by highly subsidized beef exports from the European Union (EU). The reduction of EU export subsidies, the imposition of countervailing tariffs by the Côte d'Ivoire, and the 1994 CFA franc devaluation allowed the Sahelian countries to recapture their traditional market share. A big unknown is whether the build-up of stocks of unsold beef in Europe as a result of the BSE (Mad Cow Disease) crisis will lead Europe to reinstitute export subsidies that could undermine Mali's market share.

A similar, but somewhat less serious issue, arises from the U.S. export of very cheap poultry parts (e.g., leg quarters and turkey necks) into coastal markets, such as Ghana. Malian livestock exporters report that the availability of this cheap poultry limits demand for Sahelian beef in the coastal markets.

4.5.2 Opportunities And Potential Interventions

The major opportunities in Mali's livestock sector appear to be in improved seasonal feeding and limited fattening for both the domestic and export markets. Seasonal feed shortages lead to significant weight loss and prevent cattle from reaching their current genetic potential. Better nutrition also would allow animals to be marketed at an earlier age, thereby increasing herd turnover and livestock owners' incomes. This has greatest potential in southern Mali, and appears to have become much more profitable following the CFA franc devaluation (Metzel et al., p. 39). Improved feed availability is likely to have a much greater payoff in the short-run than genetic improvement for beef production (there may be some scope for genetic improvement in dairy).

Potential interventions include feeding, and a renewed push for greater export marketing for both large and small ruminants.

Feeding—The main interventions here should be aimed at improving feed availability and quality. These include:

(1) inclusion of information on the price and availability of key feedstuffs, such as peanut and cowpea hay, in the OMA's weekly market information reports. This would facilitate the fattening activity by strengthening of the emerging forage markets in peri-urban areas; and
(2) continued policy discussions with the Malian government to push for full liberalization of the cotton-seed market, which is necessary to rationalize the feed industry.
(3) a study to explore the feasibility of instituting improved range management practices at the commune level (e.g., the creation of grazing associations to manage the communal grazing areas). Based on the results of this study, USAID may want to support work with commune-level associations aimed at improving pastures and other feed availability;
(4) applied research by IER (and a related extension effort) to determine least-cost rations for different types of livestock and different feeding regimes, based on locally available agricultural products and byproducts;

Development/Strengthening of export markets beyond the Côte d'Ivoire–Targeting the promising Ghanaian, Guinean, Beninois, Togolese and Nigerian markets for live animals is strategically important given the political disruption and attendant increased harassment of Malian cattle exporters in Cote d'Ivoire, Mali's chief export market. Some specific activities include:

(1) Developing a simple "cattle on feed" market report would help potential buyers like the Kano abattoir manager to identify producers in Mali who had suitable animals for export and when they would be available. OMA, in conjunction with OMBEVI, could prepare and diffuse such a report

(2) Continued support, via the bilateral programs and the West Africa Region Program (WARP), to the regional market information system network, will help make information on potential alternative markets more available to Malian exporters.

(3) Continued limited support to trader associations, such as the West African Agro-Food Business Network, has the potential to play a key role in bringing political pressure to bear on both sides of the

border to reduce non-tarriff barriers. The key here is to avoid putting so many resources into these organizations that they become highly donor-dependent and lose their own initiative.

Identifying constraints to expanded small ruminant production—Most interventions, to date, have focused on cattle. Given the broad-based ownership of small ruminants in Mali, identifying the constraints to increasing their productivity could have very positive income distribution effects.

Meat exports are unlikely to be more profitable than exports of live cattle in the foreseeable future, except with the possible exception of exports of select cuts for high-income markets in the Middle East and the coast (e.g., Gabon). Promoters of meat exports have historically failed to take into account that the coastal markets put a much higher value on byproducts (e.g., hides and feet are consumed as food in Ghana and Cote d'Ivoire).

4.6 Hides and Skins

4.6.1 Subsector Overview

The overall profitability of livestock production for meat depends not only on the value of the meat but also on that of the byproducts, hides and skins being among the most important. The production of hides and skins is dependent on the number of animals slaughtered in Mali. Records from official slaughter houses show increased production of hides and skins since 1995 for both cattle and small ruminants. Official slaughtering, however, is estimated to represent less than 40% of total cattle slaughtered (about 495,000 animals) and less than 15% of small ruminants slaughtered (3,100,000 animals). Production levels in Mali are strongly influenced by demand for red meat and the competitiveness of meat vs. live animal exports to other countries in the region (e.g., Côte d'Ivoire). In addition, the ability of the tanneries to attract hides for processing depends on the level of competition for hides to export to the coast as food. In recent years, Ghanaian women merchants have begun coming to Bamako to buy cattle shanks/hooves and hides for shipment to Ghana for food.

The Yiriwa study concludes that the hides/skins sector has great potential, which is not being realized at present. This conclusion seems dubious. Tanneries have had difficulty getting adequate supplies due in part to government policies (e.g., an export tax on hides that decreased incentives to sell cattle on the domestic market), and in part to higher demand (and prices) in coastal countries for animal byproducts that have little value in Mali.

4.6.2 Key Constraints

The very poor quality of Malian hides/skins and the poor quality of artisanal leather products appear to be the biggest problems in terms of both export markets and domestic consumption. Many factors lead to poor quality: poor animal health (e.g., external parasites), branding procedures that damage the hides/skins, poor skinning techniques, inadequate infrastructure for butchering animals and drying hides/skins. USAID-supported efforts (via CAE) to work with herders and butchers to improve hide quality have had only limited success. The decline in the quality of hides/skins exported from Mali has meant that importers are no longer willing to prefinance purchases; this results in erratic supply because local traders lack the necessary capital. Another key problem is the lack of pollution legislation and enforcement to prevent the tanneries from polluting waterways, particularly with the chromium they use in their tanning processes.

4.6.3 Opportunities and Potential Interventions

Apart from continued CAE work with potential investors in this area, no major USAID interventions are apparent. There may be some scope in working with NGOs to expand the market for Malian artisinal leather products, both in export markets and in conjunction with the tourist trade, but this is likely not a large activity.

4.7 Poultry

4.7.1 Subsector Overview

Very little statistical information is available on the poultry sector in Mali. The sector is divided into two major systems: traditional and modern. There are two major products: eggs and meat. The analysis done by Yiriwa Conseil indicates that production of meat in the traditional sector is quite profitable and could be expanded. About 12,000 birds per week are exported to the Ivory Coast, where the demand for the traditionally produced meat is high.

In the traditional production system, birds are free range and scrounge for food from materials available in the local environment. Disease and mortality are high, but production costs are low. The major constraint on increased production is space for the birds to live and scrounge for food. Egg production is quite low in this system and is considered a by-product of the meat production objective.

In the modern system, production conditions are quite difficult. Chicks are imported at a high cost. Feed ingredients are expensive, and the blended feed rations are not nutritionally balanced to provide good feed conversion. Some large producers blend their own feeds, and others provide ingredients to feed mills to have feed custom blended for their needs.

Egg production is estimated at about 31 million per year compared to a total demand of about 39 million, leaving about 8 million per year to be imported, largely from the Ivory Coast and Senegal. Broiler production in the modern system is small compared to the traditional system, partly because of the higher costs, but also because of the consumer preference for "free range" birds. However, it appears that there may be potential for increased demand in the future as consumer demand outstrips capacity of the traditional system, and potentially the modern system becomes more efficient.

4.7.2 Key Constraints

For the modern system, the major constraints are the following:

1) Technical know-how in modern poultry production: nutrition, disease prevention and management, production management, etc.

2) Availability and cost of feed ingredients. Maize is the major ingredient in poultry feed if the conversion rate is to be good, and there is insufficient maize for much expansion. Also, fishmeal is often of low quality. Fishmeal should not be used in poultry rations for more than about 5 percent of the ration, and it appears that the use is substantially higher than that. It also appears that the fiber content of the feed may be too high for good feed conversion.

3) Cost of imported chicks. Day-old chicks are not produced in Mali at present. Most have been imported from Europe, but that will be prohibitively expensive with the demise of Sabena and Air Afrique. Imports from other West African countries are possible, but local production would be far more cost effective.

4) Lack of credit for what is perceived to be a very risky business makes the operation quite tenuous. With credit, producers or feed blenders could purchase maize at harvest time to lock in a low price and supply. Credit is also needed for purchase of chicks and to modernize feed mills and production facilities.

5) Quality standards do not exist for blended feeds, chicks, or egg and meat products. Introduction of quality standards could improve the efficiency of the whole chain.

For the traditional system, the major constraints are:

1) Because the birds are totally in a "wild" environment, disease is high, and growth rates are slow.

2) Given that the birds depend largely on whatever is available from the environment for nourishment, expansion is limited.

4.7.3 Opportunities and Potential Interventions

A combination of improving efficiency in both the traditional and modern poultry production systems combined with rising incomes in Mali is likely to increase the market for poultry and eggs. In the traditional system, capacity might be expanded by greater use of supplemental feeds such as maize and by greater use of vaccines for the most prevalent diseases. In the modern system, production costs probably could be reduced considerably if baby chicks could be produced locally. (Although efforts to date have not succeeded, the dramatic decline in air service to Mali might change the economics of importing chicks). Training farmer in better poultry nutrition could dramatically improve feed conversion in the modern system. If farmers can improve efficiency in these ways, Malian poultry will become less expensive relative to beef and thus a more popular source of protein.

USAID could intervene in at least three important areas:

1) An equity fund might invest in a potential joint venture between a Malian company and a foreign company to create the capacity for production of day-old chicks in Mali. The foreign company would bring the technology needed for successful chick production. Production of day-old chicks in Mali would lower the chick cost and ultimately the cost of producing broilers and eggs.

2) Peanut meal can be an ideal source of protein for poultry diets. In the past, Mali has produced more peanuts than today. Aflatoxin problems have been a major barrier to expansion and use of peanut meal in poultry rations. If these problems could be solved, peanut production for oil, animal feed, and direct human consumption could be expanded considerably.

3) Technical assistance is needed in feed formulation, blending, and quality control. Feed constitutes most of the cost of producing poultry meat and eggs. Feed conversion efficiency in

Mali generally is quite low. It takes over 3 pounds of feed to produce a pound of poultry meat in Mali, whereas more advanced countries require less than 2 pounds. Improved feeds would lead to better feed conversion and therefore lower costs for poultry meat and eggs. If the modern sector in Mali could reach a conversion rate of 2.5, costs would fall at least 15 percent, and much of that would be passed on to consumers in lower meat and egg prices. The lower prices, in turn, would expand the market for poultry products and thereby the inputs used in poultry feed like maize, peanut meal, fishmeal, cottonseed meal, and other locally produced feed ingredients.

In each of these cases, the linkages with the rest of agriculture are strong. Also, the interventions would lead to a fall in poultry meat and egg prices, which would have widespread consumer benefits, particularly in urban areas.

4.8 Dairy

4.8.1 Subsector Overview

Most ruminant livestock are managed as dual-purpose animals in Mali, and dairy production is an important enterprise in rural areas, particularly for women. In the past 20 years, peri-urban dairy production has also grown, aimed at satisfying a growing urban demand for milk. A 1999 study by KIT estimated national milk production at 316 million liters for cattle, 23.5 million liters for goats and sheep, and 3 million liters for camels (cited in *Schema Directeur*, vol. 1, p. 64).[15]

Per capita dairy product consumption in 1996 was less than 20 liters per year (liquid milk equivalent), less than half of the target consumption set by the Malian government for the year 2000 (Bonfoh, 2001). In spite of its large number of milk producing animals, Mali imported approximately 15.5 billion CFAF (US $2.1 million) worth of dairy products in 1999, mostly powdered milk from Europe.

4.8.2 Key Constraints

The major constraints facing the Malian dairy industry are the following:

1. *Feed constraints*. These are the same constraints outlined in the section on the livestock/meat and poultry subsectors. For peri-urban intensive dairy production, the problems in the feed concentrate market are particularly important.

2. *Rural marketing constraints*. There are a number of food safety concerns about milk marketed in rural areas. Developing techniques to stabilize the milk could also expand market opportunities for rural women engaged in this enterprise. The Central Veterinary Laboratory, with support from INSAH and the Swiss foreign assistance agency, is conducting a research project (*"Lait Sain pour le Sahel"*) aimed at addressing these issues, so there is probably no need for USAID action in this area at this time.

[15] In contrast, the production figures provided by the Yriwah study appear very unrealistic, reporting milk production from goats and sheep as constituting 54% of total milk production in Mali.

3. *Low cost of imported powdered milk*. As long as imported milk powder remains highly subsidized, it will be difficult to develop the mass market for fresh milk, particularly in the urban areas. The recent reduction in export subsidies, linked to the EU's establishment of tighter production quotas for milk, has led to some price increases in powdered milk and begins to open the door for the establishment of a broader market for fresh milk in Bamako. How EU subsidy levels evolve in the future will be an important determinant of how much this market can grow.

4. *Weak managerial talent for running a cooperative milk plant.* The effort by APCAM and Bamako-area dairy farmers to establish its producer-affiliated milk plant has been plagued by weak management.

4.8.3 Opportunities and Potential Interventions

The major opportunities relate to alleviating the domestic constraints mentioned above. Specifically, feed quality and availability and marketing issues merit attention. Potential interventions include the following:

1. *Improving feed availability and quality.* These are the same recommendations as for the livestock/meat subsector, including possible work at the commune level with local grazing associations and efforts to improve the feed concentrate market.

2. *Technical assistance on cooperative dairy plant management.* Over the long-term, there probably is a potential for expanded production and marketing of fresh milk in the Bamako area. Such a market could help expand incomes and employment of local farmers. Should the financing be forthcoming for completion of the SOLAIMA plant, USAID might want to consider whether it should offer technical assistance on the management of such a producer-run plant.

4.9 Fish

4.9.1 Subsector Overview

Mali has a total area of about 1,240,000 km^2. At periods of peak flow in normal rainfall years it has from 20,000-30,000 km^2 (1.6-2.4 percent) of water area, located mainly in the inland Delta of the Niger River. There are about 700 km of waterway along the Senegal River and its tributaries, along with about 900 km^2 of reservoir area behind the Selingué and Manantali dams. The difference between peak and ebb flows of the Senegal and Niger River systems is substantial. In good rainfall years the difference can be three to one. In average years, it is five to one. In drought years, overall flows may be cut more than half affecting not only fishery productivity, but irrigation water availability, recessional agricultural area, and available forage and fodder.

4.9.2 Assessment of Value-Added Potential

Based on sales at dockside, the total contribution of primary fish production is about $45 million with about $5.6 million in export sales. About 75% of the catch is smoked, salted and sun-dried, or seared. Fresh fish consumption increases with the size and reliability of the catch and with proximity of the fisheries to urban centers.

Fresh fish provides greater absolute value-added opportunities, but total consumption is limited by the low purchasing power of Malian consumers, the high energy costs for production and storage of ice, and lack of insulated transport (whether on water or on the roads), high transport costs linked to poor roads and expensive fuel, and taxes sauvages (It is difficult to hide fresh fish from police at stops). When the economy cools or is shocked, less fresh fish is purchased and in good catch years processed fish remains for up to a year or more in storage (1999/2000), and are relegated to onward processing for feed and oil as a salvage operation.

4.9.3 Key Constraints

The Malian fishery is a competitive fresh water fish supplier to national and nearby markets, especially fish in smoked and dried form. Fresh water fish is competitive with imported marine fish when local supplies are abundant. In times of drought, and during the low flow season, frozen marine fish may become competitive with local fresh fish. The large variation in water flows in the principal fisheries is the biggest constraint to value added activities.

Malian dried and smoked fish will increasingly lose their competitiveness on EU export markets for sanitary control reasons. Drying and smoking are done primarily on wooden structures with a large amount of hand contact. Since the late 1980's, the European Commission has increased its overseas inspection and surveillance of fresh, frozen, and smoked fish. Smoked and dried fish, most of Mali's production, is handled many times in processing on drying racks that are difficult to clean. The drying and smoking processes would not pass EU or FDA inspection. However, regional markets are much less demanding.

The cold chain for fresh fish is spotty at best. Ice production capacity is concentrated in Bamako. Transport remains undifferentiated with only partly iced fish transported in baskets in uninsulated trucks. The largest fish offloading port at Mopti has rapidly deteriorating infrastructure and is being crowded out by other trade. Ice machines do not meet peak demands.

4.9.4 Opportunities and Potential Interventions

It is very difficult to quantify opportunities for fisheries development in Mali, despite the research programs being run by IER with support from French Aid via IRD (former ORSTOM) and the FAO. Urban growth in the secondary cities of West Africa (as opposed to the large coastal cities) may stimulate demand for increased fish exports from Mali. Improvements in drying should provide the opportunity for increases in extra-regional sales. Finally, development of a cold chain from Mopti to Burkina Faso or Ferkessodougou in Cote d'Ivoire would increase export potential.

USAID does not have a comparative advantage in the freshwater fisheries subsector. We do not propose any important investments in this area. Currently USAID supports improved smoking and drying of fish and quality control through IER. USAID can continue to focus of supporting IER training of micro-entrepreneurs in micro- and small-scale processing (drying, smoking, salting), cleaner handling, storage, and packaging of fish products. The technologies exist and are known in Mali. As long as this activity is fully subsidized or nearly so, it will not increase the costs of the women involved. However, hard-nosed analysis needs to be done to see if there are really any input (energy, salt) savings, reduced waste or spoilage, or improvement in the realizable value of the product that would justify the extension effort. If

the rational is public health, i.e., subsidize cleaner and better processing to reduce food-borne disease incidence, then perhaps the public good benefits start to approach the public costs.

4.10 Horticultural Crops

4.10.1 Subsector Overview

INSAH did an update through 2000 of the PRISAS post devaluation study of horticultural production, export, and import trends in the Sahel (Simo, Yade, and Sow). They found that most of the Sahelian countries had made some gains in horticultural production (onions, potatoes, tomatoes, and green beans) and exports (or import substitution) after the 1994 devaluation, but were unable to maintain the growth over time. A few major exceptions were noted: Senegal, Niger and Mali continued to expand onion production, and Mali alone continued to expand potato and tomato production. Aggregate Sahelian imports of onions have increased dramatically since 1995 (Senegal is principal importer), tomato imports declined slightly through 1998 and then began to climb again, and potato imports have been slowly growing since 1998. On the export side, Mali has continued to export potatoes to the Côte d'Ivoire with small amounts also going to Europe, while Niger remains the biggest onion exporter in the region, with Mali exporting primarily to Côte d'Ivoire. This update of aggregate Sahelian trends shows that Mali remains a key actor in the Sahelian horticultural sector. The growth in imports of many neighboring countries that began two or three years after the devaluation suggests that there may be market opportunities in the region (e.g., onions in Senegal) that could be captured by Malian producers and exporters. The expected demographic shift to a predominantly urban population in West Africa in this decade should provide additional growth opportunities. Domestic Malian markets are still undersupplied in onions and potatoes, along with other vegetables, for much of the year. While Mali has exported green beans, potatoes, and onions to Europe in the past, there is little scope for expanding extra-regional exports unless post-harvest handling and transport can be improved significantly.

Fruit. Mali has been a competitive producer and exporter of mangos to Mauritania, Senegal, Guinea, and Ivory Coast for decades. It has been a small exporter of mangoes to France both directly by air, and more recently by sea. Indirect exports of Malian mangoes through both Burkina Faso and Cote d'Ivoire have occurred historically, because both possess much better postharvest packing and handling facilities and have greater access to air, rail, and boat transport. Over the past decade Burkina Faso has expanded its mango production, adding more of the high color varieties sought by the international market. Over the same time, Ivorian planters have increased their crop diversification programs to include more mangoes, papayas, and other exotics. Mali produces papayas varieties that are well-suited to domestic and regional markets, but has only begun to produce the smaller Hawaiian types (Solo) that are sought by extra-regional buyers. Fruit production has been centered in Southern Mali and Sikasso for many years, with expansion in belts around Bamako and in the growing secondary cities where irrigation is available.

Alternative Horticultural Crops. Hibiscus, Ginger, Okra, Amaranth, Chili Peppers, Tamarind, and Néré are among the alternative cultivated and gathered products that are important as beverage and condiment components of the Malian and regional diet. The Tiger Nut (*pois sucré--Cyperus esculentus*), while cultivated on a tiny scale for years in Mali and throughout Africa, has been reintroduced as an export crop by Spanish and Malian interests. These crops offer may offer niche opportunities for local, regional, and extra-regional markets. All of these crops are produced throughout the subregion. Mali's competitive advantage lies in its ability to do the intensive labor needed to grow or gather and handle these crops at a low labor cost.

4.11 Assessment of Value-Added Potential

For purposes of this discussion, value-added is taken to mean adding value to product in excess of the value of the inputs used. Horticultural crops are generally higher in unit value than cereals, grain legumes, and forage crops. Conversion of land from lower to higher-value crops can be a value-added activity in itself. **Diversification** to horticultural crops holds potential wherever a reliable water supply and market approach costs are reasonable. **Intensification** is the second general value-added strategy across Malian crop production. While Mali has very respectable yields, there is still considerable room for yield improvement from increased input use, better variety selection, and improved production practices. **Reduction in waste** is the third cross-cutting value-added strategy. Elements of this strategy include broader use of maturity indices to time harvests, use of proper harvest techniques and containers to reduce damage to harvested crops, and use of improved postharvest storage techniques. **Processing and Packaging** is the fourth approach to adding value to products. It is most successfully applied when there is good quality raw material that is consistently available at prices below fresh market levels and where there is strong market demand for processed products. **Utilization of by-products** may also add value, for example, in the use of culls from fruit or vegetable packing operations as fodder for livestock. Value can also be added by **improving market linkages** by moving from consignment sales to contract sales or by integrating forward in marketing channels by investing in distribution networks or sales outlets. Finally, value can be added by **improving transaction and organizational efficiencies**. Examples would be speeding up payment for consignment sales of fresh produce in export markets, or grouped purchase of seed and fertilizer for production, packaging materials for processing, and order delivery services.

4.11.1 Key Constraints

Lack of Investment by Experienced Professionals. Malian producers have increased the volume and value of horticultural output since devaluation. However, there are only a handful of producers who are forward integrated with packing and shipping operations. There is a total absence of the international investors who drive the major horticultural export industries and who have the financing to build logistic channels to both regional and international markets. Mali's horticultural subsectors are technologically and organizationally late in comparison with their near neighbor competitors (Cote d'Ivoire), the continental leaders in their subsectors (Kenya, Zimbabwe, Egypt and Morocco), and the world leaders (e.g., North America, Western Europe, Chile, Brazil, South Africa). It is about twenty year's behind the times in terms of organization of production, packing, and marketing. Given the accelerating pace of change in the horticultural industries worldwide, Mali does not have time to home grow its horticultural sector. It needs to make an order of magnitude jump in at least one horticultural subsector. None of the existing players appear to have the capacity to make the threshold investments required, and government policies related to land titles, import duties, and generally high overall taxation of the formal sector all increase risk and costs to investors.

Transport costs and unreliability. Transport makes up about 30 per cent of the costs of imports of all kinds, including packing, packaging materials, and fuel. Comparable figures for other countries in West Africa are 12-14 percent (UNCTAD and Price Waterhouse). Mali is at the end (or beginning) of a long and bumpy logistic chain whether the market is the West African Coast or overseas. High taxation of transport equipment (duties and VAT) and transport services (VAT) and fuel itself is an easy way for the Malian government to indirectly tax the 70-80% of the economy that is informal. However, this policy provides a disincentive for investment in differentiated transport services in Mali. It also provides a

massive incentive for skewed transfer pricing by regional and international forwarding and transport lines that have business bases in Mali. Intermediate inputs imported for processing (primarily packaging and ingredients) increase consumer prices domestically and place Mali at a disadvantage for exporting processed products compared to its near neighbors.

Internal roads have improved but the network is far from satisfactory. With a normalized road transport index of 71 out of 100, it is near the bottom of West African nations on this World Bank development indicator scale. The rail line to Dakar continues its decades-long process of deterioration. Its privatization is embroiled in political and financial infighting and is substantially behind schedule. Upgrading of service to permit reliable handling of refrigerated produce will take at least two years after privatization.

Malian exporters benefitted in the past from very competitive air transport rates ($0.75-0.80/kg), but available space was highly constrained. Costs are likely to increase to the $0.95 to $1.00/kg level because of decreased space and increased security costs at all airports following the September 11 tragedy. Scanners and explosive detection equipment installation at international airports will cost in the range of $2.4 million per airport with recurrent operating and maintenance costs of about $150,000.

Intermodal transport (truck to rail, truck to rail to ocean, rail to ocean) has been a big structural breakthrough for transport to and from Mali, but costs are still high because of the lack of reliable backhaul volume from Mali to either regional or extra-regional destinations. Containerization is increasing for imported products, but the lack of reliable container handling on the Kolikouro-Dakar rail line keeps costs high and reduces transit and destination scheduling to narrow windows. This is one of the factors that severely constrain development of the Malian mango export industry.

Unreliable Energy Supply and High Energy Costs. Fresh or processed products require substantial energy inputs. While energy (electricity, gas) is heavily subsidized for domestic use, rates jump for industrial users. The power grid in Bamako is unreliable and all manufacturing industries must invest in generators. Elsewhere in the country self-generation of power for industrial purposes is a must. Low reliability and high costs increases the operating risks and costs for product handling, washing, grading and packing equipment, temperature and humidity controlled storage, and processing equipment. Malian horticultural industries are at an energy cost disadvantage relative to coastal countries. Completion of the gas pipeline along the West African coastline will deepen this cost disadvantage, particularly for agroprocessing industries that use gas or can use waste heat from pressurization stations. Today, most microprocessors in Mali rely on wood and charcoal for their energy needs. Gas driers are micro-units and used only when raw material costs are at their lowest (e.g. the peak production periods for mangoes, okra, tomatoes).

Shallowness of the Domestic Market. While a middle class is emerging in Mali, it is small and still poorly remunerated. The vast bulk of the consumers are near or below the poverty level. For horticultural products, this means that consumption is extremely price sensitive. Consumption of horticultural products will be highly seasonal (highest consumption when production is high and prices are low) and skewed towards products that have longer shelf life (onions, cabbage, potatoes, and root and tuber crops) or can be easily preserved through sun-drying or brining. Adding value to perishables that requires technical skills (overhead and labor costs), energy inputs for storage or processing, packaging, and distribution also tends to put the product price out of reach of the purchasing power of more than 8 million Malians.

Disorganized Supply of Raw Materials and Poor Quality Control. Production takes place on small units spread over large areas. There are few large farms and even fewer farms that are vertically integrated with packing facilities, processing operations, or wholesale markets. Planning of production, harvesting, and marketing is poor. There are layers of transaction costs in aggregating products through many local markets and individual smallholders.

Low-quality labor force. Mali's labor force is cheap, but it is not necessarily low cost because it is also primarily illiterate and enumerate. The lack of an educated work force translates into long lag times in the transfer of technology to the farm level, to micro, small and medium enterprises, and to the processing plant floor. This means that both basic training and ongoing supervision costs require more direct management involvement and time than in neighboring countries. It also means less reliable repair and maintenance services.

Competition from better endowed and organized origins. As an example, competition from imported potatoes to Mali's primary export market (Cote d'Ivoire) from the EU, South Africa, and even Northern Africa is a potential constraint (threat) to market expansion. It is unlikely that Mali can take much more than 30% or so of EU or South African position on the estimated 34 KMT imported potato market in the coastal West Africa states. One the other hand, medium-term projections show that the key demographic transition from predominantly rural to predominantly urban will take place in West Africa around 2003. The growth of secondary cities in the sub-region (WALTPS, CILSS/Institut du Sahel) should lead to increased demand for potatoes, and other middle and upper middle class products, over the medium term (five years).

Mali has made remarkable progress in potato production, but there are classic issues of good quality seed supply, improving yields from about 60% of EU, US, and RSA average levels to closer to 80% levels, and improvements and harvest and postharvest handling. The sector is technically constrained by monopolistic supply of seed potatoes, input quality and delivery timing issues, viral (and probably fungal and nematode) disease challenge, lack of investment in postharvest storage and lack of refrigerated transport. It is organizationally challenged by the small average size of potato fields, multiple handling of potatoes throughout the postharvest chain to aggregate supply, and highly variable application of quality control standards.

If the current trends in the seed potato industry continue, Mali (and many developing countries) could see an increase in seed potato costs. It is not clear that Mali's potato production volume can support the costs of developing seed potato multiplication (micro and mini-tuber production and subsequent bulking) that would be needed to maintain good seed quality and industry productivity. Mali would need around a 150 KMT potato industry to do so. Dutch aid and the IER have worked on tissue culture multiplication, and proposals have been put forward to build a commercial tissue culture facility to support micro and minituber production. These proposals are probably a mistake. Mali does not have a suitable climate for seed multiplication. To get less expensive seed, the Malian industry has to get big enough to support more than one or two suppliers.

A similar case can be made against the development of a vegetable seed production industry in Mali. National vegetable seed industries are almost always a mistake unless the formal industry is big and dynamic, supporting research infrastructure (whether public or private) is strong, and good seed multiplication and storage capacity (refrigerated and humidity controlled for germplasm, breeder seed, and certified seed) exists. None of the three is present in Mali.

4.11.2 Opportunities and Potential Interventions

One opportunity for horticultural production is tied to the possibility of freeing up the rotations on Office du Niger land. Currently, farmers must plant rice to hold and use land in the Office du Niger. De-linking land access from rice production should enable more rapid growth in higher value horticultural crop production. It would also provide greater flexibility in the scheduling of crop production and marketing. It would enable, for example, *hivernage* production of potatoes, sweet potatoes, etc. as rotational crops and permit exploration of the viability of expanding other root crops, cassava and sweet potatoes, along with their leaf protein, vitamin A, and antioxidant contribution, to local markets for humans and for fodder.

While it is tempting to attempt to rank crops for investment, the supporting data are poor. Evaluation of the domestic resource costs of most horticultural crops has not been done since the FCFA devaluation. Looking at crops that have a large production base and some scope for expanding exports into the 4,000 to 10,000 MT range needed to obtain better transport terms points to mangoes, potatoes, and shallots if broad economic and employment impact is sought. Other crops are more appropriate for an opportunistic approach working with enterprises that bring long experience with production and marketing and can vertically integrate their operations into the difficult Malian investment environment.

The main suggested intervention is to continue to use CAE to improve business and technology skills. CAE focuses on enterprise development and does careful screening private sector candidates who can build strong vertical links back to producers and forward to markets. It takes more resources to break into export markets than into domestic markets. Continued targeted assistance by CAE should enable a few firms to work towards breaking through the export ceiling that has plagued Mali for decades. However, the export transport chain will need substantial strengthening before broadly-based growth in the horticultural sector can occur.

4.12 Oilseeds

4.12.1 Subsector Overview

In Mali, cotton seeds, peanuts and shea, known locally as karite, are the most important oilseeds. Sesame and soybeans are also produced, albeit at in small quantities. There may be potential to expand sesame production in the future.

Cotton Seed

Cotton seeds are a joint product in the production of cotton lint. CMDT, upon ginning seed cotton, sells cotton seeds to HUICOMA, which has been granted monopoly power to manufacture oil in Mali. HUICOMA is a mixed firm in which CMDT, the State, and the private sector are share holders with 53, 40 and 7 percent, respectively. Until recently, HUICOMA bought cotton seed at a very low fixed price of 11 CFAF/kg and transported it at an average cost of 10 CFAF/kg to its mills located in Koutiala, Koulikoro and Kita. Cotton seed price was recently increased to 29 CFAF/kg, but it is still much below that in neighboring Cote d'Ivoire and Benin, where oil, cottonseed meal (animal feed). and soap are manufactured. HUICOMA also produces soap and animal feed but has been plagued with serious inefficiencies resulting from the HUICOMA monopoly and a quota system.

Despite the low acquisition price of seed, oil produced by HUICOMA has not been competitive in domestic markets, requiring stringent protective measures to keep the local firm in business. HUICOMA's poor performance prompted the government to undertake an audit, which found a host of inefficiencies in its operations and management. Thus, there is room for improving HUICOMA competitiveness. However, it is unlikely that HUICOMA can venture into a new line of products to add value to cotton seed.

Peanut

Peanut production is concentrated in four regions, namely Kayes, Koulikoro, Sikasso and Segou. Among these regions, Kayes is by far the largest peanut producer in the country, accounting for over 35 percent of peanut supply during the period 1984-1999. During this period, total peanut supply grew by about 11 percent per year, but this growth emanated almost entirely from expansion in cultivated area. Although peanut supply stagnated from 1995/96 to 1998/99, it increased spectacularly in 1999/00 to reach its all time peak of 278,000 tons.

This subsector, until the early 1990s, was under the leadership of the Office de Développement Intégré des Productions Arachidières et Céréalières (ODIPAC) in charge of extension and marketing unshelled peanuts in Kayes, Kita and Kolokani located in western Mali. Peanuts, collected by ODIPAC, were sold to SEPAMA, which produced shelled peanuts and unrefined oil either exported to Europe or sold in the local market to HUICOMA, which in turn supplied refined peanut oil for the domestic market. The involvement of numerous government-owned parastatals in peanut-based products distorted the incentive framework and led to high costs to the point where Mali could no longer sell its products in the international market. As a result, the parastatals were dismantled in the early 1990s and left a vacuum that has not been filled by the private sector, except to produce for the local market. Also, serious aflatoxin problems plagued the sub-sector.

Since dismantling of the parastatals, peanuts have been processed mainly by the private sector. The bulk of peanuts is consumed in the form of butter by Malian households. The demand for peanut butter has been so strong that the Malian government, in collaboration with the Chinese government, is planning to put in place a processing unit in the Bamako region.

There exists considerable potential to add value to meet local and regional demand for raw nuts, oil and peanut meal, and butter. The bulk of peanuts is marketed locally in raw and butter form usually processed by women. The combination of favorable agro-ecological conditions and farmers' experience with the crop suggests that Mali could be competitive in groundnut production, but more analysis is needed to determine which zones have a comparative advantage in peanut production.

As indicated in the poultry section, there is considerable potential for expansion of that sub-sector. Peanut meal is an ideal source of protein for poultry feed, and extraction of peanut oil is a very simple technology. So there may also be potential for increased peanut production for oil and meal, given that a market will exist for the meal.

Shea

The performance of this subsector is hard to assess because data are poor. Estimates of shea supply indicate that production varies between 80 and 250 thousand tons per annum and occurs mainly in the regions of Bamako, Bougouni, Koutiala, San, Segou and Sikasso. This subsector is heavily dependent on women. Collection of shea is exclusively a female activity that lasts between May and August-September. Once shea is collected, it is buried to facilitate fermentation, dried and pounded in a mortar to yield nuts. While a large portion of the nuts is sold to wholesalers, some of it is dried and pounded with mortars to obtain the powder. This powder is then cooked and laminated on a stone to obtain a thick butter, which is then manipulated by hand and heated to obtain some oil.

Export demand for good quality shea almonds is strong in Europe and Japan, but the quality of Malian production lags behind that of neighboring countries such as Burkina Faso. Exports of industrially processed butter (by Karite-Mali, SIKA) are not competitive to some countries that are importing nuts and processing themselves. Industrially processed shea butter is also not competitive with traditionally processed shea butter in the domestic market.

4.12.2 Key Constraints

Cotton seed: The competitiveness of cotton seed oil is affected by the high cost of imported inputs to process oil and by poor management. The restructuring of HUICOMA and the increase in seed price will be a test for the future viability of the oil subsector. Also, if the cotton sector is liberalized, it is possible that cotton seed would be exported, and that could change the economics of both oil and animal feed operations in Mali.

Peanuts: The peanut sub-sector is constrained by many factors including: (i) lack of improved seeds in the production zones, making it difficult for farmers to increase yields to lower unit costs; (ii) low level of fertilizer use in the production zones; (iii) poor storage facilities causing a high level of aflatoxin; (iv) painful and labor-intensive processing activities due to the lack of appropriate technology; (v) lack of transport in the production zones; and (vi) strong competition from other vegetable oils in the domestic market.

Shea: The constraints to shea are: (i) the time consuming collection of shea fruits and the heavy burden on women's time; (ii) the lack of convenient processing technology; and (iii) lack of transport facilities in rural areas.

4.12.3 Opportunities and Potential Interventions

Shea: There is a good opportunity to increase exports by improving collection techniques to reduce waste. The recent change in the European Union rules to permit use of shea butter in cocoa manufacturing provides a good opportunity to expand shea production. Demand for shea butter is also strong in the cosmetic industry and can be a source of income for rural women. To maintain a long-run income stream, a systematic program of protecting existing trees and planting new ones needs to start soon, using grafting methods developed by research.

Sesame: While India, China, Myanmar, and Sudan dominate world sesame production, there has been considerable expansion of sesame production in Australia, the USA, Mexico, and other areas around the world. African programs supported primarily by NGO's have also ramped up production. While consumption growth still exceeds the growth of production, it is expected that demand will flatten out over the next three to five years. Apart from the sesame oil trade, the sesame seed trade (confectionary) tends to promote production to get a broad set of suppliers who will compete for market share through quality and pricing. While NGO activities in Mali have substantial room to increase domestic production as long as peanut production is depressed, and can count on three-to-five years of growth in exports, it would be a mistake to project sustainable Malian exports beyond the 2000 to 3000 MT range. Maintenance of existing activities in this arena should permit this level to be reached over the first half of the strategic plan period.

The Platform Project funded by a pool of donors appears to be a good opportunity to reduce women's burden. It plans to target 450 villages, but it has equipped 200 villages only. USAID could join the pool of donors to speed up the process of equipping additional villages with the multi-function platforms and improved shea and peanut processing. Mali has underutilized processing capacity and reportedly only harvest half the crop. Even much of that harvest is gathered too late to maintain quality. There is a seasonal labor use conflict with other crop production. The key issues are very practical ones. How do you increase the portion of the crop that is collected? The timing of collection? Improve the average quality of the nut? Improve intermediate storage? Reduce the time to processing or sale?

Concentrating on promoting the shea butter in the US markets will not solve these problems. In fact, it is more likely to benefit the better organized producers and processors in Burkina Faso and Ghana than those of Mali. Ghana, which is a larger producer of shea butter than Mali, has 65% of its processing capacity lying idle. In December 2001, a new plant that adds 33% more capacity to the Ghanaian industry came on line. The new facility has the capacity to quadruple its capacity by adding modular units. It was put in place by a partnership of two of the largest shea butter traders and marketing organizations in West Africa linked to the dominant shea butter formulation and distribution company in the world. While Malian processors are spared very much direct competition for supply by the CFA/Cedi exchange barrier today, they are still subject to the direct product competition on world markets. Over the 10-year strategy period, if the exchange barrier comes down, more direct competition for supply will take place.

While in broad development terms, a shea marketing effort in the USA may be beneficial for the West African industry, what will it do for the Malian industry? The market will procure the bulk of its requirements from the more reliable and cost-competitive sources.

If USAID is interested in pursuing activities in the shea butter industry, it should adopt a vertical approach working along the entire value chain from production through marketing. Early involvement should be weighted towards the improving production, collection, quality preparation of shea nuts, and maintenance of the shea nut quality. Innovative transnational work in West Africa will be needed to attack the development of shea butter markets in a way that will pay off over a ten-year period. Such an activity will not be inexpensive, but the pace of development with a gathered crop cannot be forced by front-loading expenditure. It will require nothing less than a long-term business plan for the industry and an annual investment of somewhere between $300,000 to $500,000 to realize.

Facilitating the multiplication of improved peanut seeds could help expand the oilseed area, as Mali has good production conditions for peanut. Technical assistance in storage and processing also would help ensure a market for the products.

4.13 Seeds

4.13.1 Subsector Overview

Recent studies[16] suggest that there are serious structural problems in the seed industry. These problems include:

- Contradictory regulations which fortunately, have not been enforced. Revisions of the laws have been prepared, but with little or no input from farmer groups, professional associations, private seed growers, and seed importer associations that have only recently been formed.
- The coordinating structures of the National Seed Plan are the National Seed Council and the National Seed Variety Committee. Neither has farmer or private sector representation. The Seed Council meets too infrequently to fulfill its role of planning the level of basic seed (R1) needed to meet a recommended seed variety renewal period of three years. The National Seed Variety Committee meets but hasn't kept the national seed variety catalogue up to date.
- The National Seed Service (SSN), which has guided seed multiplication in Mali since 1989 is scheduled to be disbanded in 2002, leaving a major void in the organization of basic and certified seed multiplication.
- The Institut d'Economie Rurale provides new varieties for a range of crops. As an Etablissement Publique à Caractère Administratif it now sells pre-basic seed to the SSN for multiplication.
- The Direction Gènèrale de la Réglementation et du Contrôle (DGRC) that is responsible for seed regulation and the management of the Laboratoire de Semences (Labosem) is a new structure. The seed laboratory needs to be decentralized to provide for seed analysis closer to the sites of production and distribution.
- The Office du Niger, CMDT, and OHVN run their own seed programs. There are high rates of rejection of cereal seeds by the seed laboratory when samples are analyzed. Presumably CMDT does better cotton seed multiplication than food crop seed multiplication.
- There is a lack of information on private sector participation in the seed industry as importers, producers and distributors of seeds. The private companies work primarily with imported vegetable crop seed, maize, and irrigated rice.
- Low returns to individual or grouped farmer multiplication of dryland seed (Villages Semenciers) established with the aid of the FAO from 1989 through 1996 provide little incentive for seed multiplication.

[16] Lamissa Diakite et Alpha Macki Diarra. Octobre 2000. "Etude de développement de la filière des semences dans les pays du Sahel (Cas du Mali): Rapport Final" CILSS/INSAH et IER. Bamako. This study is partly synthesized in Bakary Kante, Mariam Sow, Samba Ly, and Valerie Kelly in "Developpement de la filiere semences au Sahel et integration regionale: Quel role pour le secteru prive: Le cas du Mali.

4.13.2 Key Constraints

The key constraints follow from the problems indentified above. With the state getting out of the seed dissemination business in 2002, distribution of improved seeds will be highly constrained without intervention.

4.13.3 Opportunities and Potential Interventions

Despite – or because of – the many constraints, opportunities for seed multiplication, dissemination and demonstrations are numerous.

1. Mali has a good history in millet, sorghum, maize, rice, and cowpea varietal development. Maintaining this capacity and developing efficient approaches to maintaining breeder and foundation seed multiplication is an essential food security and growth-supporting function of agricultural research. Support to these crops needs to be maintained and perhaps increased. At a minimum a national security stock of breeder, foundation, and first generation certified seed should be maintained as a drought or other catastrophic crop loss (desert locust or political disturbance) insurance policy. USAID has not been directly involved in the seed sector for some time. GTZ, Dutch Aid, and AFD have been involved.
2. The PASAOP may provide an opportunity for attracting the necessary participation of the private sector in varietal research and seed multiplication decisions and funding.
3. The call for rapid decentralization of the National Seed Laboratory seems premature. Laboratory personnel are scarce. Seed laboratory equipment, while relatively inexpensive, requires a regular income to maintain in operating condition. Strategic location of at most two seed labs would probably cover the national needs. Both GTZ and Holland have extensive experience in these issues.
4. USAID, at relatively low cost, could add a seed market information report to its current support to OMA. This could be accompanied by support that looks at seed demand on key dryland and irrigated cereals and forage crops to better target information needs in the creation of a private market for certified seed producers. The new input suppliers association, chambers of agriculture, trading networks, NGO's would be appropriate partners in these efforts. The seed market network should include neighboring countries where peanut, maize, bean, and forage seed production is available.
5. Vast advances in seed technologies internationally provide Mali with the opportunity to import high quality, certified seed for local testing and adaptive trails. Rather than erecting barriers to seed importation, Mali's research institutions should instead focus on regulating such imports through the DGRC and the National Seed Laboratory.
6. USAID, as a matter of policy, should support regional and international free commerce in certified seed that is accompanied by adequate phytosanitary certification. Over the ten-year strategy period, it may be appropriate to help support a seed or input association that addresses seed trade issues

There is great scope of USAID interventions in improving seed quality in Mali. It likely would be productive for USAID to support seed multiplication by producer groups and NGOs combined with demonstration activities bringing together appropriate packages of seed, fertilizer, and water retention technologies. It appears that substantial production gains could be achieved for sorghum, millet, peanuts, and perhaps maize. The state is vacating seed multiplication this year; seed multiplication for these crops is not profitable at present; and yet, the improved seeds offer significant yield gain potential (coupled with other inputs).

4.14 Fertilizer

4.14.1 Subsector Overview

A well-functioning fertilizer subsector is arguably one of the most critical (and best documented) prerequisites for sustainable growth of Mali's agricultural sector. Because fertilizer is often the largest single input expenditure that a farmer makes and often the most expensive inventory item that an input trader stocks, development of the fertilizer sector goes hand in hand with the development of the banking and credit system.

Mali is one of the Sahel's best performing countries in terms of sustained growth in fertilizer consumption and development of private sector import and distribution networks (Kelly 2001), yet fertilizer use remains far below levels needed to raise productivity to the target levels mentioned in Chapter 2 of this report. Annual growth rate in fertilizer imports during the 1990s was 15% (up from 4% during the 1980s). Mali's average annual imports during the 1990s (22,800 nutrient tons) placed the country in 3rd place when ranked with other W. African countries (well behind Nigeria and Côte d'Ivoire but slightly ahead of Burkina Faso, Cameroon, and Benin). About 80% of Mali's fertilizer is used on cotton in the CMDT zone, 16% on irrigated rice in the Office du Niger, 2% on cotton in the OHVN zone, and the remaining primarily on horticultural crops, with small amounts going to coarse grains and pulses.

Although fertilizer use is high in cotton and irrigated rice zones, there is a need for extension programs in these zones to promote more efficient use of inorganic fertilizers. The USAID funded natural resource management (NRM) program in the OHVN provides multiple examples of how fertilizer efficiency can be improved through simultaneous use of organic matter and various efforts to reduce erosion (Kelly 2000). Extension efforts addressing the issues of soil salinization and acidification in irrigated zones must also be on the agenda for the future in these high fertilizer using zones.

Fertilizer promotion is a more difficult task in the rain-fed cereal/pulse production zones where farmers do not have a major cash/export crop with which to finance fertilizer adoption. Despite long-term efforts to promote fertilizers and improved organic methods in these zones, yields remain low and growth trends have been either negative or static. Some analysts have argued that increased productivity through the use of improved (but more expensive) technologies will not occur in these zones until something is done to reduce the extremely high variability in output prices or provide farmers with better means for coping with these price fluctuations such as cereal banks, rainfall insurance programs, etc. (Sanders et al., Hazel…).

This report is projecting an annual increase in coarse grain production of 4% per year during 5 years. This is a feasible goal for maize production, which has already been increasing at a faster annual rate, but a tall order for millet and sorghum producers. Making improved seed available to farmers will help. SG2000's introduction of shorter cycle seeds in combination with appropriate fungicides in the Segou region resulted in a small 133 kg/ha yield increase but a large return on the investment (value/cost ratio of 10) and was very much appreciated by farmers. Unfortunately, available evidence from farm-level demonstrations continues to raise questions about the potential for profitable use of fertilizer in these zones characterized by high climatic and price risk (Nubupko et al. 2000, Sanders et al. 1999). Any program to introduce improved seeds that require fertilizer will need to be carefully studied and monitored.

4.14.2 Key Constraints

1. Increased financing for importers, distributors, and farmers is critical if the fertilizer sector is to expand. As noted above, the Malian private sector is at present unable to assume responsibility for importing fertilizers for the CMDT and unable to realize economies of scale in other imports due to limited capital. Furthermore, traders are currently unwilling to invest in the storage and shop infrastructure required to build internal distribution systems capable of providing a timely, reliable supply of fertilizer.
2. Increased access to importer capital needs to go hand in hand with training to improve skills in dealing with international fertilizer markets (timing of orders, choice of shipping procedures, etc.) and government ensuring that there is an even playing field between formal and informal sector operators.
3. Experimentation with new alternatives for extending credit to farmers should accompany any effort to increase credit to traders and to do away with monopoly output markets for cotton. Currently, the CMDT interlocking credit system is substituting for social, political and legal institutions needed for credit market development. Looking at experiences in other countries (e.g., Benin) as well as trying to synthesize information from different experiences in Mali would be a useful place to start. The WB funded IFDC in 2001 to do a study of options for developing input markets in liberalized cotton systems; the results of the study are not yet available but should provide some insights (Mali was one of the countries studied). A WB is planning a workshop on the subject in early 2002. The CLUSA-style training of farmers and farmer associations promoted by USAID in the OHVN appears to have had high payoffs in terms of improving farmers' ability to conceptualize good agricultural investments, obtain bank credit for them, and achieve high reimbursement rates; this appears to be a good model for USAID to expand.
4. Fertilizer quality is an issue that has been raised by horticultural producers and some rice producers. To the extent that USAID gets involved in activities concerning grades and standards, fertilizer (and other inputs) should be included in the products covered. A recent World Bank report on input market regulation provides good discussion of various options for both seed and fertilizer quality control .
5. "Professionalization" of traders operating in the input sector is necessary. This could be supported through training programs for members of the Malian input traders association as well as programs promoting the development of regional associations. It may require the government to develop some type of formal (but simple) registration procedures for input traders.
6. Better market information systems for inputs are needed at all levels. Importers need help with finding the best import prices and qualities. Demand for information on availability, quality, and prices by horticultural produces appears to be the highest priority producer need.
7. To decrease fertilizer costs through increased economies of scale, some consideration could be given to promoting regional coordination of imports with countries through which Mali must transship fertilizer (Côte d'Ivoire, Ghana?, Benin?). This would require discussions among researchers and extension experts from Mali and potential collaborating countries to see if greater harmonization of fertilizer formulas could be achieved; this is often accomplished by shifting from complex NPK formulas to greater reliance on DAP and urea.
8. Increased fertilizer demand in the rice, cotton, and horticultural sectors will most likely come through area expansion of the crops and improvements in the credit system and extension efforts to help

farmers increase fertilizer efficiency.[17] Increased efficiency will increase profits, making more money available to reinvest in inputs.

9. Increasing demand in rain-fed cereal and pulse zones will require a concerted effort on the part of research and extension to find the right combination of seeds, NRM practices and inorganic fertilizers. A well-run program of demonstrations with the right input package could be an effective inducement to adoption. Simultaneous attention to issues of credit and price variability, and climatic risk will be required.

Fertilizer use and distribution systems vary significantly depending upon the region and crop. For cotton, there is at present an integrated system wherein inputs including fertilizer are provided to farmers with repayment coming in the form of a deduction from the delivered crop. In the CMDT zone, maize also is generally cultivated with cotton fertilizer. For other crops, there is no such integrated system. In the ON zone, producer associations have taken over provision of operating credit for seeds and fertilizers with mixed success. In other regions and for other cereals and horticultural crops, fertilizer use varies considerably. Lack of credit is commonly cited as a constraint to increased fertilizer use. For sorghum and millet, some believe availability of varieties or seeds that can take advantage of increased fertilizer is an issue.

4.14.3 Opportunities and Potential Interventions

It is clear that the low level of fertilizer use is a serious constraint to increased production in Mali. It is also clear that we do not fully understand all the reasons for the low level of fertilizer use.

The current situation presents an opportunity for expanded demonstrations on farmer's fields of use of improved seeds and fertilizers. It appears that the demonstration effect is strong, so widespread demonstrations of the increases in yields that are possible could have a significant impact.

[17] Rice farmers in the ON are already using recommended levels of DAP and most are only slightly below recommended levels of urea. Cotton farmers have tended to use less than recommended fertilizer rates since the devaluation, preferring to increase income through area expansion rather than intensification.

5. Roles and Jurisdictions of Different Economic Actors

This section contains a summary of Chapter 5 in the full report. Most sections are drastically condensed, and some were not included in this summary volume. Readers are referred to the full report for all of the background and explanatory material. The only sections that are brought forward in greater detail are those containing specific recommendations for USAID actions.

Over the last 20 years or so Mali has been undergoing significant liberalization of its economy. It has modified the rules of the game in many ways, but there is much yet to be done. Some sectors are further advanced than others. In many cases, the underlying institutional infrastructure necessary for efficient and effective functioning of markets still needs lots of work. In essence, the major objective of this section is to delineate the current situation and the task to be done in each of these areas.

5.1 Regulatory Framework and Contract Enforcement

The problem of efficient and fair adjudication of contract disputes is one of the major issues in the market infrastructure in Mali today. If Mali is to move its economy and business sector into the modern world, the ability to support an efficient and fair contracting system is essential. For this development to take place, there is a need to establish the personnel and infrastructure to enforce contract laws.

Mali has made considerable progress in simplifying its previous Byzantine system of business regulation. For judges and lawyers, it is essential that a system of continuing education be put into place to update their knowledge and understanding of the new laws on the books, particularly those related to commercial law. Many banks and businesses distrust the current state of commercial courts and laws. The biggest need is upgrading the standards and knowledge of the judges and clerks of the court. Other donors have programs in place to do this upgrading of skills, so it should not be necessary for USAID to provide support to the judicial system in Mali.

5.2 Finance

Credit and agricultural finance are top concerns of planners, farmers and private sector operators in the agricultural sector. The need for efficient financial intermediation to support savings mobilization and subsequent resource allocation to the most efficient and competitive entrepreneurs and projects is paramount to the eventual advancement of the agricultural sector as a source of growth in Mali.

If one compares cotton with other agricultural sub-sectors in Mali, the principal difference is that cotton has an integrated financing system, and the other sectors do not. In an integrated system, a single entity both provides credit to the farmers and serves a purchaser of products from farmers. Thus credit can easily be recouped at the time of purchase of the product. Without such a system, a bank is faced with the need to evaluate the honesty and credit worthiness of each of its clients and their loan proposals to adequately manage risk in making loans. Investments in subsectors other than cotton have been constrained by not having access to the integrated financial system in that sector.

5.2.1 Micro-Finance

Micro-finance institutions (MFI) play an important part in finance and credit for the rural sector. As indicated above, most small holders and small traders cannot get access to credit in the commercial banking sector. To a limited extent, micro-finance fills in some of the credit needs in this area. Many MFIs use group lending in place of traditional collateral. In recent years lending to the village associations has encountered difficulties because of the underlying state of the agricultural subsectors. There are other reasons why the village associations have not functioned well in micro-finance. Not only do the MFIs have problems with the solidarity groups with which they work, but they also have tension and difficulty in their linkages to the commercial banking sector. In general, banks view MFIs as competitors rather than potential partners. Banks view MFIs as expensive to work with because of high transaction cost and risk.

Despite the difficulties, we expect that micro-finance will continue to play an important role in providing credit for farmers and micro-enterprises linked to the agricultural sector. It is important that support for micro-credit institutions be continued.

5.2.2 Recommendations for the Financial Sector

The financial sector is extremely reluctant to provide resources for the agricultural sector. There are three reasons for this reluctance: 1) agriculture, by its very nature, is risky, 2) there is significant information asymmetry between borrower and the banks, 3) there are high transaction costs. A number of suggestions have been put forth by various observers of the financial sector to deal with some of these problems. Among these are the following:

1. To reduce the asymmetry of information between bankers and borrowers, the establishment of some form of credit bureau or credit rating system could track an individual's loan history and repayment record to prevent fraud and reduce defaults.

2. Capacity building at all levels in the banking and MFI sector is needed to reduce information asymmetry and transaction costs by better understanding of the needs of the clients, the realities of agricultural and agribusiness operations, and better management of loan portfolios. Konare has suggested an exchange of personnel between banks and the MFIs to increase awareness of how each institution operates.

3. The MFIs would benefit from several actions including: 1) the BCEAO should allow full liberalization of interest rates including small accounts and fixed deposits. This would allow the MFIs greater ability to mobilize savings and to create more flexible lending and savings instruments, and 2) the ability of the MFI to refinance its lending portfolio should be increased. The establishment of a special window in the BCEAO to support such refinancing has been discussed, but due to problems of such a facility in North Africa, there has been reluctance in the Mali banking sector to be part of it. This initiative should be re-examined to find out what the problems were in the North Africa program and to activate a better program in the CFAF zone.

4. MFIs should be expressly allowed to lend for agricultural production (as opposed to only processing or value-added activities). Operating credit will be absolutely essential to increase use of fertilizer and improved seed packages.

5. The fundamental problem in lending in the agricultural sector is the risk of such investments. It is recommended that USAID have a study done by a banking and financial expert with knowledge and experience in this area on risk reduction activities and strategies to support agricultural lending. There are a number of possible options including establishment of leasing companies to reduce the capital cost of investment, training programs and portfolio management, better business and financial plans to account for risk and risk analysis, and the three options noted in more detail below: loan guarantees, cost sharing, and venture capital funds.

6. The BCEAO currently limits interest rates for the formal and direct finance sector regardless of sector or loan risk. The usury law prevents the development of financial products for the rural and agricultural sector, and probably for the urban microfinance market, that reflect the real loan risks. As a policy issue, region wide, it needs to be revisited and modified.

5.2.3 Loan Guarantee Fund

USAID is in the process of implementing a loan guarantee program to help support economic activity in Mali. The program provides up to 50 percent loan guarantees. The maximum total guaranteed amount per loan has to be less than half the total guarantee fund of $3 million. The guarantee program is part of a special operation within AID known as the Development Credit Authority (DCA). DCA is a financing account for AID missions to provide support to activities that support development goals and Strategic Objectives (SO). The Mali program supports expanded agro-processing activities.

5.2.4 Financial Tools To Increase Investment In Agriculture And Agribusiness

To increase investment and attract modern management requires tools that reduce risk. Radical steps are needed to stimulate investment over the early and mid-strategy period (2-5 years). Cost-sharing and equity funds are two ways to stimulate investment by buying down the risks of new market development, new technology adoption, and modern management acquisition. They can be used to bring Malian capital back to Mali, induce expatriate exploration of investment in Mali, and increase the level of investment in market development and penetration.

Agribusiness Cost-Sharing Fund

Cost-sharing funds have been used in USAID programs for many years. They have tended to be successful (Morocco, Kenya) when they have the following features:

- at least half of the cost is provided by the promoter (individual, group, company, or association). If the promoter cannot provide a cash match, s/he is unlikely to be able to finance the follow-up steps if a successful venture is found;
- both national and international firms or individuals are eligible. Malian capital for agriculture and agribusiness management expertise are rare;
- cost-shares are calculated only to cover risks, not to subsidize profits;

- business references and credit checks are run on cost-sharing participants, before cost-sharing is approved;
- ranking criteria are properly weighted; for example, test shipments of a traditional product (string beans) to a traditional market (France) using a traditional channel (pisteur to exporteur sales to a commission agent) would receive a very low score. A search for buyers of cattle in Nigera or Ghana (traditional product in a new market) would receive a higher score than the same search in Cote d'Ivoire (traditional product in an established market). Production of a new product using a new technology (dried organic mango slices with differentially permeable plastic packaging) for shipment to a new market (UK) would receive a high score;
- ranking criteria incorporate a time-to-return period that is consistent with product and market development cycles and the life of the project. Cost-sharing funds are best used to try to quickly test and accept or reject market, technology, or management approach. One production and marketing cycle (18 months) is about the longest cost-sharing period that should be considered. Anything longer than a production and marketing cycle is an R&D investment program. The fund can be divided into small/quick disbursing activities and larger/slower disbursing activities.
- disbursements are made against completed expenditures to the supplier or provider upon verification of payment and physical completion of part or all of the activity;
- agreements must incorporate completely transparent account examination and audit procedures;
- agreements must incorporate confidentiality accords, as well as reporting requirements;
- procedures for doing initial environmental examinations and obtaining timely review;
- procedures for application of AID regulations of grants, procurement of equipment, prohibited origins, goods, and intellectual property rights have to be translated into simple guidelines. Cost-sharing agreements incorporate AID's regulatory language.
- A committee of disinterested parties (USAID, government, private sector as appropriate) is established to approve large cost sharing agreements. Small cost-shares (the size of a large or small cost share is a design issue) need speedy decision-making that may be best left in the hands of USAID and the fund manager.

Cost shares basically offer businesses a way to extend their product and market development budgets to areas with potential but with high associated risk. They tend to be managed using some form of technical assistance that searches for partners, technology providers, and market opportunities and then plays the role of matchmaker to structure the cost share. USAID can orient the cost-sharing to those subsectors or types of activities that have high labor and high female labor content, but it should not expect every activity to meet a set direct job generation or gender-specified threshold for approval.

Mali Equity and Growth through Agribusiness (MEGA) Fund

Investment capital and reliable management are fundamental to agribusiness success. They are in short supply in Mali. Cost-sharing will enable working relationships to be established between foreign and Malian businesses. A Malian poultry operator may be able get a day-old chick supplier in Cote d'Ivoire to come and explore establishment of a chick operation in Mali. Marketing directors often have the discretion to spend their already allocated budget on such exploratory ventures. But, to induce a Babcock or Hi-Line regional board to set up a Mali operation with a Malian partner requires their boards to assess the opportunity costs of capital and management that they would need to put in place. One way to reduce the risk to the investment is to buy it down with an equity fund. A twenty-five percent equity position, can provide the investment anchor that frees up both local partner and international partner

capital. In Mali, an operating partner with an established track record in the region would be as important as the capital investment that is made.

Objectives of such a fund in Mali would include:

- Inducing Malians with established businesses in regional countries or outside the region to re-invest in Mali;
- Providing a mechanism to supply anchor capital to attract experienced management for joint ventures or new companies established by Malian and regional or international partners;
- Reducing the financial packaging and risk coverage costs of investment in agro-enterprises in Mali;
- Leveraging investment and finance from third parties.

The design challenge for a fund of this type is to estimate the level of leverage of investment that is likely to occur so that a good business plan can be developed for the fund. In middle income countries, a total financial leverage factor of around twenty would be sought (20 times the fund investment from other capital and loan sources). In Mali, leverage of from 5 to 10 times should be targeted.

The minimum size for such a fund is about $5 million. A fund smaller than this cannot do enough small ($100,000 to $250,000) or large ($1,000,000) investments to provide for early re-flows and to spread its risks. One of the design issues is finding the right initial size to ensure that risks can be spread without starting at so high a level that the fund managers have no incentive to seek additional capital for the fund. One of the advantages of a fund established as a not-for-profit institution registered in Mali is that it can seek to attract capital from other donors – both private and public.

Fund operations would consist of identifying opportunities and partners (investment promotion agencies, banks, financial institutions, and targeted cost-sharing) and assisting in the development of the investment. It is not unusual for only one in five opportunities to reach the investment stage. Each equity investment includes a share buy-back provision. Depending on the investment type and cash-flow profile, the agreement would specify the earliest time that a company could start to buy out the equity fund and the latest time that a company could start to buy its shares back from the fund.

Funds are generally structured with a board of directors drawn from the business and government community (if the latter is allowed under national law). International as well as national directors may be appointed. While USAID cannot directly participate on the board, it can ensure that the articles of incorporation are written to preserve USAID's right to appoint a majority of the Board Directors and approve management appointments. Good knowledge of respected and honest people in the business community is a must. USAID may also direct the drafting of the investment policy of the fund at inception, or provide that it's funds be directed to specific sectors. Attempted fund micro-management, however, is a recipe for disaster.

Comparison of Cost Sharing and Equity Funding

A cost sharing fund could be established within an existing or new contract that works in agribusiness development. Staff with experience both in Mali and in the main markets of interest are needed to develop a pipeline of business prospects. It would set up an account of about $200,000 to be used in small amounts, say up to $10,000. A 50% match would be set as a minimum contribution by an interested

business. Let's say that a U.S. firm has licensed an environmentally benign bacterial technology from the USDA that destroys fruit flies. The Malian team identifies their technology as a potential winner and contacts the firm. Given the potential size of the West African market, the USA firm is interested, but sees the risks as too high. To induce them to come to explore the Malian market, the team offers to reimburse a quarter or up to half of their costs to evaluate the market and see if a local partner or organization can put together trials on mangoes. Reimbursement of expenses would be done on a completion basis against receipts furnished. If the trials work, and a market exists, then the Malian team would work with both parties to try to structure broader commercial trials and demonstrations to permit a product launch. Many cost-shares would not result in commercial deals, but perhaps one in five to ten would. However, the ones that do work can result in the establishment of businesses that work and grow for many years after the life of project. Cost sharing is an inexpensive way to leverage private sector business effort that cannot be purchased on the open market at two to three times the daily rates of private sector consultants.

Even with a couple of years of trials and development of a commercial entry strategy, the above example might never get off the ground, because either the local or US partner could not get their banks to back a two year market development effort. Let's assume that the fruit fly technology gets to a takeoff point, but needs a million dollars to finance the two year launch. Despite the trials, banks are unconvinced that the technology is a winner. The Malian partner works well with the US firm, but cannot get a bank loan to finance her portion of the deal. The US firm finds its bankers reluctant to provide more than one year financing of exports of the bacterial insect killer. Together their venture is undercapitalized. An equity fund could step in and pick up a minority position of say $100,000 in equity and $50,000 in a short-term loan at commercial rates. The fund's manager could designate a board director for the new firm. If the fund itself is created with care, with some drawn from the financial and industrial communities, the board composition itself may improve the credit-worthiness of venture.

In a business climate like Mali's, the choice is not which tool to use, but how to use both of them to leverage investment in agribusiness. The advantages and disadvantages of the two approaches are summarized in Table 7.

Table 7: Cost Sharing and Equity Funding

Cost Sharing		Equity Funding	
Pro	**Con**	**Pro**	**Con**
Administrative Ease	Some Resistance in USAID to providing locally large but absolutely small private sector firms with grant funds	Provides for establishment of a structure that can perpetuate equity funding and perhaps trigger venture capital fund	Administratively complex as reflows require the establishment of a not-for profit, and because AID regulations are administratively complex and subject to contradictory interpretation, and because of local legal constraints
Fast-Disbursing, Set-Up Costs are Low	Usually limited to small, short duration activities	Can take a longer view (3-5 years)	Slowly disbursing because of due diligence requirements, set-up costs in terms of TA and legal expense can be high
Permits rapid testing of innovative technologies, market approaches, and product or service introductions	Must impose shorter time limits for activities (1-6 months)	Helps avoid undercapitalization in business expansion or start-ups	Requires care in structuring exit provisions to ensure that a return on success is achieved. Needs a legally solid exit strategy for each investment in order to succeed.
Simple to explain to business people	Still imposes irksome administrative "hoops to jump through"	Can be used to replace inadequate management	Board participation can lead to game-playing by appointed directors unless they serve at the pleasure of the not-for-profit structure and have their performance carefully evaluated

5.3 Grades and Standards

Generally, given the present structure and status of Malian agriculture, there is little justification for USAID to make a significant effort in support of grades and standards at this time. Grades and standards will become important issues in the future as Mali expands its exports, particularly international exports of horticultural products. But with cotton being dealt with by CMDT and the limited level of other exports, most grades and standards issues are best dealt with at this point by traders and traders associations and networks. Grades and standards for internal trade in such areas as seeds and feed can also be dealt with by existing institutions and activities or those recommended below. USAID, through its other projects and programs, can support these efforts, but it is not recommended that a separate effort in this area be initiated.

5.4 Transport

There is a strong need to lower transport costs for Malian agricultural commodities. The competitiveness of these commodities can be improved markedly if better feeder roads are available, transport taxes are reduced or used to maintain and build new roads, and roadblocks are curtailed significantly between Malian and coastal markets.

5.5 Rural and Secondary City Electrification

Another constraint to enhancing agricultural production and reducing poverty has been the lack of electrical power in both rural areas and secondary cities. Because of the limited electrification in Mali, storage activities can hardly develop, leading to spoilage of agricultural commodities. Processing activities generally need electricity to be competitive. As such, employment opportunities are limited outside of the large urban center of Bamako. Unreliable electricity supply limits development of small industry producing local consumer and producer goods. It is through such activities, in part, that one gets the linkage effects of agricultural growth stimulating employment and further income growth.

5.6 Irrigation

Expansion of irrigation is a means of increasing agricultural productivity and reducing risk in Malian agriculture. There are at least three different approaches that can be used to increase irrigation. The first is by expansion of the irrigated area in the office of du-Niger. The second is what are called *bas-fonds* which are inland valley swamps that once were rivers but have since dried up. The third approach is small scale supplemental irrigation using pumps. Each of these approaches has merit for consideration, and it is important that a careful benefit-cost analysis be conducted of the alternative approaches prior to decisions on supporting irrigation. However, we do believe that expansion of irrigated area should be an important part of the overall strategy.

5.6.1 Office du Niger

Although the Malian government deployed great efforts to rehabilitate the dilapidated irrigation perimeters, there is a considerable need to expand land under irrigation because this type of production system reduces risk and uncertainty in the erratic Malian physical environment. Expansion of irrigated land will be contingent on expanding the irrigation infrastructure comprising the primary canal, and the secondary and tertiary canals. Studies have shown that construction of secondary and tertiary canals are within the reach of the private sector because they can yield financial profits under current market conditions (Barry and Diallo, 1999). Despite this profitability, the private sector has not invested in the Office du Niger, as expected. The reason for the lack of private sector investment in the Office du Niger lies in the fact that it does not have access to medium- to long-term credit. The newly designed investment fund put in place by USAID, as well as the World Bank-funded infrastructure program, will also contribute to alleviating the lack of credit.

One of the actions that USAID can undertake to alleviate the constraints to investment in a newly designed primary canal is to initiate, in collaboration with the Government of Mali, collaboration and coordination among donors so as to join forces to fund the investment operation. The success in the cereal marketing reform seems to indicate that donors can work well together as long as they pursue the

same goal, which is here economic growth and poverty alleviation in a zone that has the potential to reverberate to other regions through the linkage effects. This investment does not have to be a one-time deal, rather a multi-stage operation requiring each donor to readjust its interventions in Mali. In this respect, USAID could work closely with the World Bank, the European Union, and the Dutch at the onset to bring other donors on board.

5.6.2 Bas-fonds

Bas-fonds are narrow inland valley swamps that once were rivers, but have since dried up.[18] During the rainy season, the water level rises generally providing water throughout the growing season. It is estimated that about 48,657 hectares of *bas-fonds* exists in Mali-Sud, of which only about 5 percent are under some type of water control. There are important land tenure issues that must be resolved, as is the case for ON. It does appear that a significant fraction of the existing *bas-fonds* production is done by women. Dimithé concludes that *bas-fonds* production is competitive under several alternative production systems. Thus, this approach to increasing irrigated area must be considered along with other alternatives.

5.6.3 Small-Scale Supplemental Irrigation

In some parts of Mali, small or medium scale irrigation is being expanded using pumps to bring in nearby river water or using wells. These approaches also merit consideration in expanding irrigated area in Mali.

5.7 Communications

Communications issues include wire-based telephone systems, cellular phones, internet access, and radio communications. To the extent that wire-based telephone systems are used, it may be necessary to have some level of government involvement and/or regulations. The reason that is so is that absent government regulation service does not get provided to more remote areas and smaller towns. Almost everywhere in the world, rate regulation for telephones is used to accomplish cross subsidization of phone service with high density urban consumers subsidizing lower density small town and rural consumers.

Mali may, however, be able to avoid significant additional investments in wired-telephone services if it liberalizes and promotes cellular telephone systems. It will be important to establish competition in cellular telephone networks in order to keep prices low and service quality high.

USAID has already been playing a significant role in the internet area. Internet access and service seems to be going well in Mali and other than continuing and finishing exiting projects, no further intervention seems to be needed.

In addition to communication by telephone, radio plays an important role in Mali particularly in rural areas. Rural stations are used for a number of communications purposes including dissemination of market price information by OMA. USAID has been supporting creation of small lower power FM radio

[18] This section draws upon "Small-Scale Inland Valley Swamp Rice Production: A Viable Enterprise in the Grain-Cotton Farming System of Southern Mali" by G. Dimithé, contained in Bingen, et al, *Democracy and Development in Mali*.

stations and is also helping to establish digital radio receivers for selected radio stations. These programs help to transmit needed information of many types including health information, market information, and general education.

5.8 Agricultural Research

Agricultural research is clearly very important for future gains in agricultural productivity in Mali. At present, much of the future organization and support of agricultural research will be linked in one way or another to the World Bank project called PASAOP. Under this project researchers will be able to compete for research funds that will be financed through distributed funding mechanisms. In addition to that vehic le, USAID may want to consider funding research in the following areas:

1. Targeted research on critical policy issues related to removing constraints on increases in Mali and agricultural productivity.
2. Subsector planning that would involve bringing together the expanded network of members of a Subsector to identify problems and constraints and means of removing them.
3. Applied research on alternative feed rations that will result improved feed quality and enhance livestock production and productivity.
4. Improving the linkages between research, extension, and training.

In addition, USAID is encouraged to get back into the business of long-term training. Many of the leaders in Mali and agricultural research system were trained at U.S. universities. It is important to inject new human capital into that system.

5.9 Market Infrastructure and Information

As the various agricultural sub-sectors begin to develop, further additional price and market information will be required. For example, in the livestock sector there will be increasing need to have information on prices of major fodder crops (peanut and niebe hay) to calculate economical feeding regimes. Information on livestock on feed will also become more important for marketing decisions as greater confined management of livestock is put into place. As the modern poultry industry expands, price information on broilers and eggs will also become more essential for making market decisions and increasing efficiency in the marketplace. In the cereals market, information on seed availability would be useful to increase access and geographic distribution of certified seeds.

6 Issues Related to a Productivity-Led Strategy

No productivity-led strategy can be successful in the Malian context unless it addresses issues of food security, risk, HIV/AIDS, gender, and environment. This chapter covers these issues and develops the relationship between the proposed productivity-led strategy and these issues.

6.1 Food Security

The Government of Mali has adopted the widely used definition of food security first proposed by the World Bank: "Food security involves assuring the total population a diet adequate to permit a healthy and active life" (OPAM, Cellule de Veille et de Logistique, 2001). Assuring food security involves addressing its three components: availability, access, and utilization. Improving availability involves actions aimed at increasing food supply through increased production, reforms of marketing systems to drive down costs of food to consumers, improved marketing technologies, and strengthened transport and market infrastructure. Improving consumers' access to food involves raising consumers' real incomes through efficient economic growth; actions aimed at income redistribution to the poor; and creation of safety nets (e.g., emergency food aid) that allow the destitute access to food when they lack real income. Utilization refers to the ability of an individual to use the food she obtains. It thus involves both improvements in food preparation and feeding practices (e.g., for young children) and general health improvements, given the very important effects that disease can have on nutrient absorption and that malnutrition can have on disease morbidity and mortality.

Food insecurity can be either *acute* or *chronic*. Acute food insecurity results from short-term shocks (e.g., droughts, pest infestations, temporary reductions in income, or disease outbreaks) that reduce food availability, access, or utilization of an individual. In Mali, acute food insecurity is most often associated with weather events (drought and floods) and pest infestations that disrupt agricultural production, marketing systems for food, and farmers' incomes. Chronic food insecurity is the result of structural problems in the economy that limit, on a long-term basis, food supply and an individual's access to and utilization of food. Chronic food insecurity thus results from poverty and from food production and distribution systems that have high unit costs (in terms of the food that actually reaches the consumer).

6.2 Climatic Risk and Vulnerability

A country as poor as Mali suffers much more than other countries from variability in climate or external market conditions. While the percentage of the population that is poor is quite high, the percentage that is vulnerable is extremely high. Dealing with vulnerability is part and parcel of poverty alleviation.

The two major themes of the strategy being proposed in this paper are risk reduction and productivity enhancement. Risk reduction is imperative if we are to reduce vulnerability. The proposed investments in irrigation, increased production of basic cereals, greater productivity in livestock through improved feeds, and in diversification through horticultural products and some value added processing activities – were all selected because they contribute not only to reduction of poverty and increased economic growth, but also because they lead to an overall lower level of risk and, consequently, vulnerability.

Box 1 - Vulnerability

As traditionally defined and measured, poverty is a static concept-a snapshot in time. But insecurity and vulnerability are dynamic-they describe the response to changes over time. Insecurity is exposure to risk; vulnerability, the resulting possibility of a decline in well-being. The event triggering the decline is often referred to as a shock, which can affect an individual (illness, death), a community, a region, or even a nation (natural disaster, macroeconomic crisis.)

Risk, risk exposure, and vulnerability are related but not synonymous. Risk refers to uncertain events that can damage well-being-the risk of becoming ill, or the risk that a drought will occur. The uncertainty can pertain to the timing or the magnitude of the event. For example, the seasonal fluctuation of farm income is an event known in advance, but the severity is not always predictable. Risk exposure measures the probability that a certain risk will occur. Vulnerability measures the resilience against a shock-the likelihood that a shock will result in a decline in well-being. Vulnerability is primarily a function of a household's asset endowment and insurance mechanisms-and of the characteristics (severity, frequency) of the shock.

World Bank World Development Report 2000-0, p. 139.

6.3 HIV/AIDS

Although HIV/AIDS poses a development crisis across much of Africa, preliminary results from the 2001 DHS survey show that Mali has one of the lowest overall prevalence rates on the continent (less than 2 percent). Older statistics from UNAIDS (1999) estimate 97,000 Malians have HIV/AIDS. Such national figures mask important trends. HIV/AIDS is rapidly increasing to alarming levels in nearby Cote d'Ivoire, Nigeria and Burkina Faso, common destinations for migrating Malians. Within Mali, some populations already have higher prevalence rates. According to the 2001 DHS survey, rates for women are 2 percent versus 1.3 percent for men. ISBS data indicate that high-risk groups (commercial sex workers, bus station attendants, truck drivers, migrants, armed forces, factory workers, youth and prisoners) have considerably higher rates (52.8 and 42.1 percent in rural and urban, respectively). Although rural rates are somewhat lower than urban rates nationally (1.5 percent versus 2.2 percent) some rural populations have rates as high as the urban average (e.g., Rural Ségou).

HIV/AIDS can decimate families reducing household labor supply, draining savings and eroding human capital. In the agricultural sector, reduced labor results in less area under production, lower crop output, substitution away from labor-intensive cash crops, and a curtailment of natural resource management techniques. As rural savings fall, so do capital investments, purchases of high-cost inputs such as fertilizer, and livestock holdings. As human capital is lost, so too are the important agricultural skills that promote productivity. Moreover, the disease affects the capability of government agencies to support troubled communities and maintain staff (especially extension agents are at especially high-risk for contracting HIV as they traverse rural areas).

Agricultural sector interventions for addressing HIV/AIDS should 1) build rural incomes, food security and resilience to shocks, 2) gather and disseminate information, and 3) build HIV/AIDS advocacy. Each of the following proposed interventions address one or more of these dimensions. All should be coordinated with efforts by the GoM, USAID and the larger donor community:

Food Security Programs. Interventions that build incomes (access), provide food (availability), or improve health and sanitation (utilization) will help prevent and mitigate HIV/AIDS. USAID should

ensure that its programs adequately identify HIV/AIDS-induced food insecurity, avoid stigmatizing targeted households and adequately match the needs of HIV/AIDS-affected populations.

Agricultural training programs. One of the great costs of HIV/AIDS is the loss of parental guidance, knowledge and skills. USAIID should ensure that agricultural training programs include and address the concerns of women, children and orphans in HIV/AIDS-affected areas. Regardless of targeted audience, training should contain an information, education and communication (IEC) component developed in collaboration with health experts.

Rural Credit. USAID should explore possibilities for broadening traditional credit programs to address HIV/AIDS conditions, in keeping with other lending for the wide array of problems faced by rural communities (see the example of Kafo Jegnew above). There is a growing experience from East and Southern Africa on incorporating HIV/AIDS into such portfolios.

Agricultural Research and Extension. As vibrant agricultural research and extension remains at the heart of a productivity-led growth agenda, USAID should support assessments of the impact of HIV/AIDS on the fragile human capacity of these institutions. The process and results of such studies can be used to help the Ministry of Rural Development develop a strategy to 1) protect its staff, 2) understand the impacts of HIV/AIDS on its client populations and 3) incorporate that knowledge into its own policies and programs. Additionally research and extension staff have an important role to play in the fight against HIV/AIDS. Across Africa, large numbers of agricultural extension workers work in dispersed communities and can be trained to disseminate accurate information on the disease, vulnerability factors, and choices of response.

Building an Agricultural Constituency for HIV/AIDS. USAID should take advantage of this low-prevalence period to use it agricultural programs to gather and disseminate HIV/AIDS information. For example, questions linking morbidity and mortality due to AIDS (and other major illnesses such as malaria) should be added to studies of agricultural production, transformation and trade.[19] Another way for USAID to build a multi-sectoral approach to combating HIV/AIDS is to support the highly decentralized GoM effort to work through a broad coalition of local NGOs addressing HIV/AIDS at the communal level.

At this stage of the epidemic, one of the greatest ways to protect Malian agriculture is to stop the epidemic before it gets started. While treatment remains a thorny issue for USAID selectively treating Mali's migrants, prostitutes, truckers, miners could dramatically decrease the transmission of this disease to the general population. Additionally, continued USAID efforts to to promote the status and economic role of women and youth will be a hugely effective way to curtail the spread of HIV/AIDS.

In conclusion, Senegal has shown that a massive HIV epidemic is inevitable. Uganda's experience suggests that the epidemic does respond to aggressive policy responses. South Africa's reluctance to address that country's burgeoning epidemic underscores the costs of mishandling the situation. While the future course of the HIV epidemic in Mali depends on a variety of socioeconomic, cultural and epidemiological transmission factors, few of these are beyond the reach of policy. As rates in

[19] Michigan State University is already adding such questions to USAID-funded agricultural surveys in Rwanda and Kenya.

neighboring countries climb with alarming momentum, Mali has an opportunity to develop an effective multi-sectoral response to contain and hopefully reduce HIV/AIDS.

6.4 Gender

Gender issues have been treated above in all the sections for which there are gender specific impacts. For example, horticultural crop production is normally done by women, and stimulation of irrigation will enable more women to produce horticultural crops especially in the off-season. Also, peanut production is another important activity for women. Some of the value-added activities described above also tend to be handled mainly by women. But beyond the activities directly done by women, increasing agricultural productivity – making more cereals available for human consumption directly impacts the lives of women and children through improved nutrition and reduced poverty. It also provides the resources locally to finance sustainable programs in maternal-child health, education, and nutrition, all of which disproportionately benefit women and young children.

The main point of this section is to argue that USAID/Mali should assess the impacts on women of the programs and projects it chooses to implement. The agency should not assume that women will benefit equally without an analysis of the impacts on women of USAID interventions.

6.5 Environment

Agricultural production can have negative impacts on the environment if farmers do not use adequate levels of inputs in combination with anti-erosion measures or if they incorrectly apply or use excessive amounts of inputs. Low agricultural incomes can also promote excessive exploitation of forest resources (e.g., wood, charcoal, medicines, animals) because farm households are forced to use these resources to supplement inadequate farm incomes.

The prevailing situation in most of Sub-Saharan Africa is one of inadequate attention to external inputs and anti-erosion measures (Weight and Kelly, Sanchez et al.), which leads to degradation of soil and forest resources. In Mali, we find increasing soil degradation caused by soil mining and deforestation. Both are the result of addressing increased population pressure on the land through reductions in fallow and expansion of cultivation to woodlands and forests or marginal lands not suited for crop production. Research in the CMDT cotton zone confirms that nutrient depletion of the soils (e.g., van der Pol 1992) and the long-run impacts of current production practices on soil quality and productive capacity (Dalton) are serious problems.[20] Even with the relatively high levels of fertilizer used in the CMDT zone, soil nutrient depletion and general soil degradation are continuing. This problem has been exacerbated since the 1994 devaluation, as farmers have greatly expanded cotton area and reduced fertilizer doses (Tefft et al. 1998). The combined effects of expansion to marginal lands, lower fertilizer doses and low use of anti-erosion techniques (CMDT 1998 reported that only 28 percent of farmers use these techniques) has been reduced yields. Multiple factors lead farmers to pursue these undesirable practices, including cash and

[20] Although there is agreement among researchers that nutrient depletion and soil degradation are serious problems, there are differences of opinion concerning the long run implications. Van der Pol's nutrient balance methods of analysis using research trial data suggest dire consequences and very costly losses of soil capital; the more complex EPIC modeling procedures used by Dalton that take into account farmers' actual practices rather than practices used in research trials show soil degradation continuing over time but at a much slower pace than that suggested by the van der Pol work.

labor constraints as well as the underlying institutions associated with communal land use rights (Tefft 2000).

Although there has not been the same type of research on nutrient depletion, soil degradation, and use of anti-erosion techniques in other zones of Mali, there is general agreement that coarse grain yields in these zones have been stagnant or declining as a result of soil degradation from soil mining and erosion.

Available evidence suggests that Mali is not yet experiencing serious problems due to the negative effects of salinization commonly associated with irrigated agricultural production systems such as the Office du Niger. In contrast to salinization, the level of soil acidity is increasing in the ON, and care should be taken to reverse the process because of possible adverse effects on commodity production. Although we have no evidence of soil acidity being a problem in the cotton zone, it has been identified as a problem in other cotton areas in the Sahel (e.g., Senegal). One way of reducing risks of soil acidification is to encourage farmers to use chemical fertilizers in combination with organic fertilizers (manure, crop residues, etc.) rather than as substitutes for them.

If USAID were to consider future development of an NRM program in another zone, the following key ingredients would need to be present from the start:

- a profitable cash crop with reliable markets and reasonably stable prices;
- improved, affordable NRM technologies that benefit both cash and food crops; and
- training programs that equip young farmers with the literacy and management skills needed to function as effective commercial farmers, both independently and in associations.

If USAID accepts the recommendation in this report that some future investments be targeted at irrigated production zones such as the Office du Niger, various *bas fonds*, or peri-urban horticultural zones, which are using various types of irrigation, the first ingredient is already present (profitable rice and/or horticultural products). The availability of appropriate NRM technologies would need to be researched through discussions with IER, ON, Operation Riz Segou, and other research/extension services. Assuming that appropriate NRM technologies were already 'on the shelf', a USAID project that focused on promoting these technologies and funding a CLUSA-type training program that to empower farmers (both individually and collectively) to become commercial farmers could be a major contribution.

Information available to the team on (1) the performance of village associations in the *Office du Niger* (e.g., continuing problems of cash management, output marketing, and credit) and (2) the lack of collective action by farmers in the horticultural sector, suggests that some combination of NRM technology transfer and CLUSA-type training could be a valuable contribution to improving farmer capacity to increase value added at the farm level while conserving productive resources (soil, water, trees, etc.).

This type of training/technology transfer combination would also be very appropriate for seed multiplication projects. As seed projects would likely be in zones similar to the OHVN where USAID has a good knowledge of available NRM technologies, the transition from the current OHVN program to a new one would be relatively easy.

7 Proposed SEG Interventions

All of the analysis and stock-taking above leads us to suggest an investment portfolio for USAID that builds upon past activities and successes and at the same time departs from past practice in some important ways. The underlying themes of our recommendations are risk reduction and productivity enhancement.

Risk reduction is imperative for several reasons. Agriculture constitutes about 45 percent of Malian GDP, but the agricultural component is highly variable, and the variability in agricultural GDP "explains" 92 percent of the variability of total Malian GDP. If we are to achieve increased growth and stability in Malian GDP, we must grow and stabilize agricultural GDP. The variability in agricultural GDP comes from two major sources: climatic variability (mainly rainfall) and world market variability (mainly for cotton and gold). Neither of these "external" factors can be controlled or affected in any way by Mali. Thus, a risk reduction strategy must take these factors as givens and develop coping mechanisms.

Productivity enhancement means getting more with less. That is, we use a combination of improved technologies or capital investment to obtain greater outputs from Malian land and labor. The process of economic development is one of people becoming better off through increases in the value of what they produce and exchange. If we are to achieve poverty reduction objectives as well, we must also pay attention to the distribution of the productivity enhancements and income increases.

Fortunately, the risk reduction and productivity enhancement objectives are quite complimentary. That is, we can define a set of interventions that both enhance productivity and reduce or cope with the overall level of risk in the economy.

Also, as many of the strategies are designed to increase exports of agricultural commodities, the multipliers through the rest of the economy are quite strong. To have multiplier effects there must be demand for the increased production. Exporting is one means of assuring that demand. In addition to offering strong growth multipliers, exports also offer some risk reduction potential. To the extent that Mali produces surpluses in normal rainfall years, these surpluses can be exported, and produce the direct and indirect income increases that are so important. But in years with low rainfall, a greater percentage of the production can be consumed in Mali. Thus, exports can be thought of as a sort of sponge that absorbs excess production in good years and returns the increased income. In bad years, that "excess capacity" relative to national needs becomes a basis for national food security.

The linkages among the major proposed interventions also are important. For example, we propose interventions in cereal production and also in livestock feed improvements. To the extent that livestock productivity is increased, there will be an increased demand for cereals for livestock feed. Conversely, if cereal production increases to the point that grain prices fall, greater amounts will be consumed by livestock. Thus, these interventions are quite complementary.

7.1 Major Proposed Interventions

1. **Investment in irrigation** – The potential for productivity enhancement and risk reduction through irrigation investments is enormous. Risk is reduced for the family participants because they are no longer dependent on rainfall, but it is reduced for the economy as a whole as well, because the overall market basket becomes somewhat less vulnerable to rainfall variability. The productivity enhancement is obvious - crop yields will be multiplied many fold in the impacted zones. One important crop that will be produced is rice.[21] Much of the increase in rice production will be exported to neighboring countries. The potential for increasing rice exports has been clearly demonstrated in other studies. In addition to rice, there will be an increase in horticultural crop production, which is done mainly by women. These crops are produced both for domestic and export markets. Some of them also offer potential for value-added processing. We recommend that USAID make direct investments in irrigation in collaboration with other donors. Before making the investments, a more comprehensive analysis of the benefits and costs of alternative irrigation investments should be undertaken. One possibility is canal irrigation in the ON. Another is the *bas fond* irrigation. Yet another would be rehabilitation of existing irrigation infrastructure. The objective is to expand irrigated area to reduce risk and enhance productivity. The technology and incentive mechanisms used must be carefully evaluated to get the highest return for USAID investments.

   Analysis needed - In collaboration with other donors, an analysis of potential irrigation investments will need to be undertaken prior to undertaking an irrigation project. The analysis should include projections for finance of the private sector components of the investment package, evaluation of the economics of the irrigation alternatives (ON, *bas-fonds*, small and medium scale, and perhaps others), and evaluation of alternative incentive mechanisms.

2. **Investment in improved variety seed multiplication, dissemination, and demonstration** – We believe that yield increases for sorghum and millet of 20-30 percent might be possible if improved seed varieties were more widely available and used in combination with fertilizer and water retention technologies. The GOM is getting out of the seed business in 2002. Analysis indicates that under current conditions, multiplication of sorghum, millet, and maize seeds is not profitable on a pure private sector basis. This is understandable under Malian conditions. Non-hybrid seed multiplication has received public support in most countries that have successfully developed their agriculture. Germplasm maintenance and foundation seed availability are keys to success in this area. USAID should work with IER and other donors to support rationalization of these basic functions. Moreover, we are proposing that USAID provide assistance to NGOs and/or producer associations who would do the seed multiplication and dissemination. A system of incentives to accomplish this objective would need to be designed. The system also should include demonstration plots on farmer fields widely spread around the country to demonstrate the benefits of improved seed and fertilizer use. Even yield increases of 10-15 percent would have major impacts on poverty and vulnerability reduction in Mali. The program should be designed so that over time some of the associations could move towards becoming full-fledged seed companies. Creating an appropriate incentive system to

[21] We think it is very important that no compulsory cropping scheme be imposed on farmers. That is, farmers should be free to grow rice or any other commodity they choose.

accomplish the multiplication and dissemination and to help the more successful operations evolve towards private seed companies is very important.

Analysis needed - An analysis of mechanisms to use to encourage seed multiplication by producer associations and/or NGOs is needed. This study should also estimate the potential gains from widespread adoption of improved varieties, and thereby serve as a check on the benefits of undertaking this activity. The system must include extension of production packages of appropriate seed, fertilizer, credit, and water retention technologies. The design also should include mechanisms that could lead to the development of a private seed industry in Mali within five-ten years.

3. **Investment in cost sharing and/or equity funds** – Capital investment does not occur in the food and agricultural sectors in Mali at the desired rate because the investments are too risky compared to other investment options. Thus, some means of reducing the risk is required to obtain increased investment. Cost sharing and equity funds are means of reducing the risk born by Malian or external investors. In essence, cost or equity sharing would be buying down the risk and making Malian investments competitive with other alternatives. From USAID's perspective, this approach also would leverage USAID funds probably by a factor ranging from 5 to 10. These funds could go into activities like production of day-old chicks in Mali to expand poultry production or value-added processing of agricultural commodities.

   Analysis needed - **Study of the financing system.** The fundamental problem in lending in the agricultural sector is the risk of such investments. It is recommended that USAID have a study done by a banking and financial expert with knowledge and experience in this area on risk reduction activities and strategies to support agricultural lending. There are a number of possible options including establishment of leasing companies to reduce the capital cost of investment, training programs and portfolio management, better business and financial plans to account for risk and risk analysis, changing usury laws, and the three options discussed in chapter 5: loan guarantees, cost sharing, and venture capital funds. Following this study (assuming no major impediments are identified), a study should be undertaken to design appropriate cost sharing/equity fund mechanisms for implementation in Mali.

4. **Technical assistance in animal feeding** – Animal feed quality is a major constraint in expansion of livestock, dairy, and poultry production. Quality of feed ingredients is poor; there are no standards for blended feeds or concentrates; and there is little producer understanding of animal nutrition and its importance in production efficiency. We believe there is potential for significant productivity gains in livestock, poultry, and perhaps dairy with successful technical assistance in this area. Greater feeding efficiency means that less feed is required per kilogram of meat, eggs, or milk produced, and ultimately means that consumers would pay less for these products than would be the case without the productivity gains. It also means that more of the products could be exported or substituted for imports.

   Analysis needed - A consultation is needed to determine how best to go about animal feed quality improvements including possible implementation of grading and standards, technical assistance, etc. This activity should encompass poultry and ruminants, thereby including forages.

5. **Policy analysis to achieve Malian and USAID objectives** – Success in the above activities and in many of the other areas mentioned in this report requires a policy environment conducive to

achieving economic growth. We recommend that USAID support targeted policy studies designed to support and assist Malian and regional policy makers in their move towards greater market orientation. Policy studies should be undertaken as part of each of the investment activities recommended in points 1-4 above. In addition, policy analysis should be an ongoing part of each of these activities to help ensure their success. USAID should consider a policy project to group the various analyses needed and to be able to respond to future policy issues as they emerge.

Additional related Analysis needed –

1) Study the structure of linkages from agricultural growth in Mali to other sectors of the economy (backward, forward, consumption, fiscal, employment). Understanding the nature of these linkages is critical to know how growth in the agricultural sector (e.g., through export promotion) affects employment and income in other sectors—particularly the generation of jobs for the poor. The analysis in Chapter 3 and in Annex 2 is based on many assumptions that need empirical validation. While we believe the general conclusions are correct, it will be very important to have a much better comprehension of the nature and size of these linkages.

2) Analysis of public finance issues at the commune and cercle level—How to effectively tap resources from increased agricultural productivity for investment in health and education infrastructure? If increased agricultural productivity is to lead to better health, nutrition, education, and the like at the local level, some of that growth must be tapped and reinvested in programs aimed at promoting those goals. In the context of decentralization, there is a great need to examine ways that local governments can develop sustainable financing mechanisms for these programs, fueled by the increased local incomes coming from higher agricultural productivity.

6. **Long-term training** - Many of the leaders in Mali today benefited from long-term training in the U.S. We recommend that USAID bring long-term training back into its portfolio to help produce the next generation of Malian leaders.

7.2 Activities to be Continued

1. The technical assistance program currently packaged in CAE should be continued. It is providing valuable technical assistance in both the agricultural commodity and value-added areas.

2. Micro-finance activities should be continued. They should be expanded to include agricultural production operating credit. A greater effort should be undertaken to coordinate with other donors in this area. Virtually every donor is doing something in micro-finance with almost no coordination. Also, micro-finance program modifications may be needed based on the overall finance study recommended above.

3. Support to the market information system (OMA) should be continued and expanded to cover other commodities and regions. Market information is vital to the efficient functioning of markets, and this project provides the only currently available information in many cases. Efficient markets will be absolutely necessary for success in the other interventions proposed in this assessment.

4. The OHVN system for extension and improved environmental management should be applied in the ON and other areas where USAID chooses to make investments.

7.3 Activities of Lower Priority

The major area in which the team is not as optimistic as others is in value-added processing. Our assessment is that Mali is unlikely to become competitive in many of these activities due to high transport cost, high energy cost, low economies of scale, lack of managerial talent, and a workforce of relatively low productivity. That is not to say that niche market products are impossible. Indeed, some will develop and may become profitable. We are just saying that the likely returns are higher in the areas we have outlined in this analysis.

7.4 Comparison of our Recommendations with the Draft Parameters Paper

While there are some important differences between our recommendations and the approach used in the USAID Parameters Paper[22], there are also lots of similarities. Table 8 contains an abbreviated comparison of the major issues. The major differences may be summarized as follows:

- Risk reduction, whether it be in finance or production, is elevated in importance in our recommendations. Mali is a country with very high risk, and the problems need to be addressed to achieve sustainable growth.
- The recommendations contain a greater emphasis on growth of agricultural productivity as the major engine of economic growth in Mali.
- The parameters paper puts greater emphasis on value-added processing, whereas we believe the return for investment in other areas will be higher. However, the financial risk reduction mechanisms we recommend could, in fact, result in investment in these areas, but it would be more market driven (adjusted for the risk reduction).
- We put a bit more emphasis on the potential for increasing productivity in animal production sectors. We believe the potential exists, and the activity is highly complimentary with investments in cereal yield increases.
- We recommend that USAID/Mali again invest in long-term training.

[22] USAID/Mali, Country Strategic Plan, Parameters Paper for FY 2003-2012, March 2001.

Table 8: Comparison of the Parameters Paper and Recommendations in this Report

Parameters Paper	Recommendations in this Report
Basic theme Strengthening competitiveness	***Basic theme*** Increasing ag productivity and risk reduction
Policy Reform Analytical assistance Support policy advocacy groups	***Policy Reform*** Analytical assistance, especially targeted towards intervention areas
Finance Medium-scale enterprise finance Loan guarantee Assistance in business plans Microfinance support	**Finance** Cost sharing fund Equity fund Assistance in business plans (CAE) Microfinance support (with modifications)
Agroprocessing Assist public research to respond to private sector needs Market research on new process products Norms and standards Support industry associations	Agroprocessing Norms and standards – as part of other activities such as improving animal feed quality Support industry associations
Market Development Increase market efficiencies Market information Support joint export efforts Support market infrastructure New and improved technologies	**Market Development** Increase market efficiencies Market information (OMA) Support joint export efforts (CAE) Support market infrastructure (OMA) New and improved technologies (CAE)
Environment and NRM Expand E/NRM into ON and ORS Increase use of IPM	**Environment and NRM** Expand OHVN into ON and other areas
	Infrastructure investment Invest in irrigation
	Improved cereals productivity Seed multiplication and dissemination coupled with fertilizer and improved technology demonstration
	Animal feed Improve quality of feed ingredients and blended feed
	Long-term Training